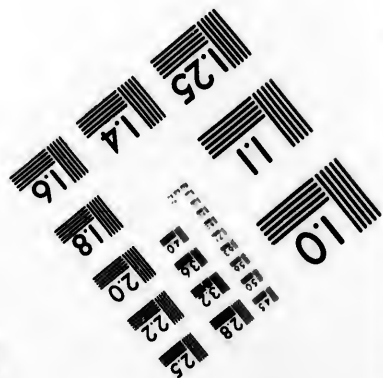
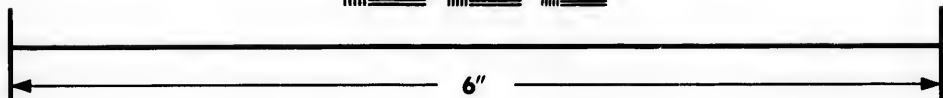
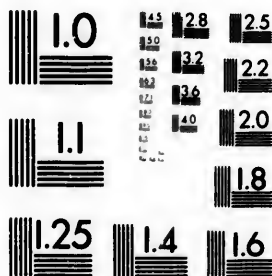


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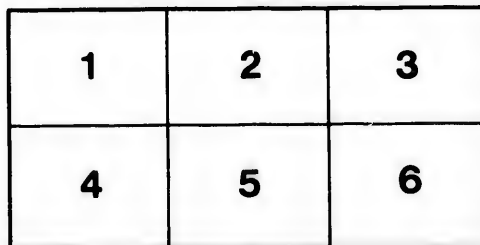
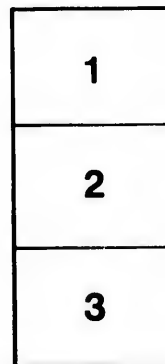
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Yours faithfully,  
Wm. S. H. M. Gully

# SEAMANSHIP.

THEORY AND PRACTICE

FOR THE

EXAMINATIONS

OF THE

ROYAL NAVY

AND

THE ROYAL MARINE FORCE

BY

J. H. B. STANTON

AND

W. H. B. STANTON



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# SEAMANSHIP.

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EXAMINER AND INSTRUCTOR

OF

MASTERS AND MATES

FOR THE

MARINE BOARD EXAMINATIONS

IN

CANADA.

BY

JOHN ST. VINCENT McNALLY,

LATE OF CAPT. R. McNALLY & SON,

*Who have succeeded in obtaining Certificates for upwards of nine hundred  
Masters and seven hundred Mates from the Belfast and Dublin Local  
Marine Boards; and now of the Firm of*

McNALLY & SEATON,

*Preparers by Government Appointment for the above Examinations,*

AT SAINT JOHN, HALIFAX, AND QUEBEC.



SAINT JOHN, N. B.

PRINTED BY BARNES AND COMPANY,

PRINCE WILLIAM STREET.

1878.



TO THE HONORABLE  
THE MINISTER OF MARINE AND FISHERIES,  
THIS WORK

IS MOST RESPECTFULLY DEDICATED

BY HIS VERY OBEDIENT AND HUMBLE SERVANT,

THE AUTHOR.

---

*Entered, according to Act of Parliament of Canada, in the year of our Lord one  
Lord One Thousand Eight Hundred and Seventy-three, by JOHN ST. VINCENT  
McNALLY, in the Office of the Minister of Agriculture.*

## P R E F A C E .

This work has been compiled at considerable cost and labour, and is specially intended to meet the requirements of candidates for certificates of competency, from the several Local Marine Boards of "*Canada*." It has not been hastily prepared, but is the result of much careful research and study, during my leisure moments, for a period of some twelve months.

In arranging it the works of the best authorities of Great Britain and the United States have been consulted, upon the subjects of Mastng, Rigging, Sailing, Stowing, and the general principles of working ship, together with the means to employ in cases of accidents and other emergencies. The names of Brady, Nares, Dana, Biddlecombe, Kipping, Stephens, Sedgwick, &c., are known, if not familiar, to most seamen, as those of acknowledged authorities.

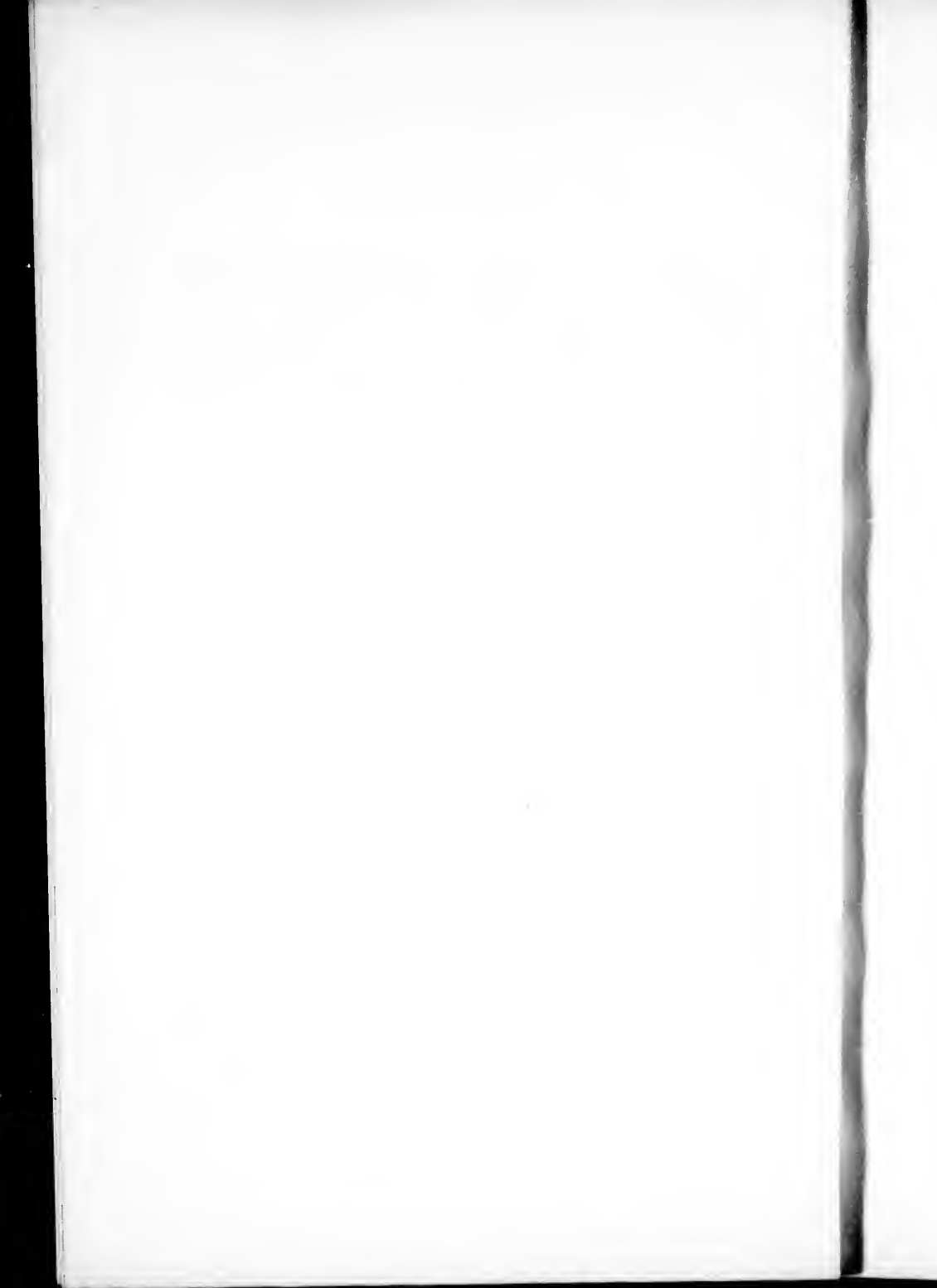
My own experience as a teacher of both Navigation and Seamanship, for the Examinations during the past ten years in the United Kingdom and Canada, has given me some claims to a knowledge of the subjects treated upon in this work. It is not only intended to qualify candidates for Examination, but to instruct young officers in many useful and important matters connected with their profession; and I venture to say in laying it before my seafaring friends and pupils, that it will be found to possess all the merits I claim for it. If in perusing it the reader is enlightened upon some subjects with which he was not previously conversant, it will have done its work, and have amply rewarded the efforts of the

AUTHOR.

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ERRATA ET CORRIGENDA.

Page 47. "The distance, per Log," *read* the distance per Log.

Page 78. "When using the mortar and rocket apparatus," *read* When using the mortar and rocket apparatus.

Page 115. "Deviation—when Westerly and when Westerly rule," *read* Deviation—when Westerly and when Easterly rule.

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# SEAMANSHIP.

## MASTING, RIGGING, &c.

Q.—If you have a thousand tons ship just launched, and lying in the river, the spars for shears floating alongside, how would you get them on board ?

A.—If the ship has channels, sling skids up and down the sides. The shears being brought alongside with their small ends aft, are taken on board either by parbuckle, derrick, or shears. As it is difficult to get heavy spars over the ship's topgallant bulwark without breaking it, the better plan seems to be to have a pair of small shears forward, with two tackles on the head of them, and to get the spars intended for shears in over the bows.

Q.—Next proceed to rig a pair of shears to take your masts in ?

A.—I would lay the ends over the taffrail, on a spar placed for this purpose across the bulwarks, and as near the after ends as may be considered necessary when crossed, put on the head lashing of a new well-stretched rope, and lash them together, the lashing being at equal distances from the heels of both. After the lashing is on, the lower parts of the shears are drawn asunder; the upper block is then lashed over the first lashing, and between the shears and the tackle, rove, the hauling part coming through the middle sheave to prevent the block from sluing in the strop; the upper or truss-tackle is made fast to one of the shear heads, and a smaller tackle or gun-tackle purchase is sometimes fixed to the others. Guys, two forward and two aft, are placed on, and the heels securely lashed to the ring bolts and stanchions, having hard wood shoes under them to divide the strain on the beams, and to slide them upon when it is necessary to shift their position. I would make a tackle fast to each heel, and hook them aft, and haul them taut. The lower block of the large tackle is then lashed forward and taken to the windlass, and the heads of shears are raised by heaving upon it.

Q.—What kind of head lashing would you put on ?

A.—A figure of eight lashing, or common round lashing.

Q.—What precaution is necessary with respect to the place on which the shears are to stand ?

A.—I would take the precaution to have the place upon which the heels are to stand properly tommed (shored) underneath.



Q.—If the head of your shears have not sufficient elevation to be easily raised, state what means you will take to help them up?

A.—I would place a derrick near the ends, or between them, or rig a small pair of shears for this purpose.

Q.—State how high the shears should be raised?

A.—The main tackle must be brought nearly to the plumb of the mast-hole?

When near the perpendicular, great attention must be paid to the after guys, and when upright the heels may be placed in any position by the heel tackles.

Q.—In what order will you take your masts in, and state your reason for so taking them in?

A.—If the three masts and bowsprit are placed by the same pair of shears, the mizenmast is taken in first, the head being abaft the shears, so that they may be slid forward to take the other masts and bowsprit in. The mizenmast is taken in first, because the breadth of beam is less aft than forward, and the heels of the shears being spread more as they go forward, the head-lashing consequently becomes tauter; moreover, if the mizenmast was taken in *last*, the bowsprit must be got in *first*, and thus the advantage of securing the shears to the foremast-head when getting in the bowsprit would be lost.

Q.—How will you place your masts alongside?

A.—With the heads aft.

Q.—Where would you lash your purchase block in taking in your masts? State the rule.

A.—I would take the height of the rail to the position of the lower block, when the tackle is block and block, and lash the lower block to the mast alongside, *at a less distance from the heel than from the block to the rail*, and it must be above the part that takes the combings.

Every person taking in a mast should know the distance from the upper purchase block to the rail, and should take care that the lower block is not lashed outside this distance, measuring from the heel of the mast, otherwise there will be a difficulty in getting it over the rail; or even should that be overcome, the heel may not go into the mast hole.

Q.—When would you put the trestle-tree, top, and cap over, and state what you would use to place them on?

A.—I would put the trestle-trees, top, and cap on when the head of the mast is upon above the rail, as it takes less time than when the mast is stepped. The truss-tackle can be used to place them on, taking care afterwards to make it fast under the top, as it will be required to cant the mast for stepping.

When the heel of the mast is as high as the rail, the heel tackle of the shears may be hooked on the mast to haul it over the hole and steady it for lowering till it enters the combings, when they must be removed.

Q.—How will you transport your shears?

A.—I should haul the shears upright by the tackle on the guys, and bowse the heels of the shears forward, taking care to have a tackle on the after part of the heels to ease away with. I would next slack away the after guys, and haul on the fore ones at the same time.

In taking out a mast, which a mate has very often to superintend, though he seldom has the job of masting one, the shears are hoisted up singly and lashed aloft, and generally remain up till the new mast is taken in.

Q.—State the rule for dropping the shear heads for taking in the bowsprit, how you will take it in and lash your purchase?

A.—The shears being dropped over the stem, the large tackle is made fast to the bowsprit, *outside the distance from the heel to the knight-heads*, the truss tackle and guys fastened to the outer end, the former to cant the heel, and the two guys to assist in steadying the bowsprit when pointing the heel through the knight-heads.

Q.—Suppose you have topped the bowsprit well up by means of the truss-tackle, and you find that you cannot get the shears sufficiently sloped to point the heel, what will you do?

A.—I would rig a jib-boom or any other spar over the fore-castle, lash the heel, and have a tackle on the outer end to haul the heel of the bowsprit out and point it.

It is singular that books on rigging have omitted mention of this spar, for though it is possible to place a bowsprit without it, something of the sort is necessary when one has to be taken out, as it requires a pull in a direct line to draw the heel clear.

Q.—What gear will you have on your mast-head before stepping it?

A.—Two mast-head gantlines with the blocks secured to the mast-head above the trestle-trees.

Q.—How would you get the trestle-trees over with the mast standing, the shears being unrigged?

A.—The shears being unrigged, there are only two methods (if the vessel is of any size), by which the trestle-trees can be got over: one plan is to take a chock out and sway them up with girtlines: the other is to lash a studdingsail-boom or other spar, up and down the mast, and have two girtlines on the end: by the latter plan the trestle-trees can be slung amidships, and easily placed over the mast-head.

Q.—Suppose you join a ship, say of a thousand tons, with her lowermasts and bowsprit in, proceed to get her rigged?

A.—I would first secure the bowsprit by the bobstays, gammoning, and shrouds.

Q.—How do you proceed to gammon your bowsprit in a large ship?

A.—By slinging some heavy weight, such as a cask of water, and suspending it from the bowsprit end.

Q.—What would you do after securing the bowsprit ?

A.—Get the top over the mast-head.

Q.—How would you place the top to send it from the deck, also proceed to get it over ?

A.—The top being placed on the deck abaft the mast, resting on its edge, the upper part aft, I would place a block on each side of the lowermast-head, and reeve two girtlines, overhaul them down, and pass them on the underneath part of the top, hitching them to the after cross-tree, and put stops on all the cross-trees in the way of the bolt holes, and stop the rim. I would also have two guys, one forward and one aft ; then sway away, and when the rim of the top reaches the girtline blocks, cut the stops hauling on the guy required, lower away and bolt it.

Q.—How is a top sent down ?

A.—The main gantlines are bent as before, but the after gantline is bent to the fore part of the top, and used for canting it over the mast-head. When clear of the mast-head let it rest on the trestle-trees, stop also the gantlines to the fore part, then sway clear, and “lower away.”

The rule is to send the mizzen top up and down on the fore side of the mast, but can be sent up abaft equally as well.

Q.—From what kind of rope is standing rigging made ?

A.—Shroud-laid.

Q.—How are the lowermasts rigged ?

A.—With shrouds and a fore and aft stay.

Q.—What is the measurement for the length of the foremost shroud ?

A.—From half way across the mast-head to the outside edge of the channel, abreast the foremost dead-eye.

Q.—How would you measure for a gang of lower rigging ?

A.—Having the length of the foremost shroud, place two posts upright at that distance apart, coil the shroud hawser round them, the second coil lying outside the first, flat on the deck ; the third outside the second, and so on. Cut the bights where the coil was commenced.

Q.—Before fitting the rigging, how much is it stretched ?

A.—One inch for every foot.

Q.—What is the measurement for the eyes of shrouds ?

A.—For the pair that goes on first, once and a quarter round the mast-head ; each of the others, in succession, the breadth of a seizing larger than the one below it.

Q.—State how the eyes are parcelled, and why ?

A.—The eyes are parcelled upwards on each leg, meeting at the

crowns; for if put on in any other way, the water, instead of running off, would get in between the parts of the parcelling, and soon rot the rope.

Q.—How is each pair of shrouds fitted?

A.—With a throat seizing on the bight round the mast-head.

(A strip or tarred canvas is put on first to keep the turns of the seizing from opening the service.)

When there are a number of ropes supporting a spar, as many as possible are fitted in pairs: the middle or bight of the rope is placed over the end of the spar, and a seizing is put on to form an eye. Thus, with an even number of ropes, they are all fitted in pairs, with throat seizings on the bight. With an odd number, they are all fitted in the same way except the odd one, which, being a single rope, is fitted with an eye splice.

Q.—What proportion must the lanyard be to the shroud?

A.—Half the size.

Q.—What proportion must the dead-eye be to the shroud?

A.—Once and a half the size.

Q.—How far is the foremost shroud served down, and why?

A.—All the way, as it catches the chafe of the sail.

Q.—How far are all the rest of the shrouds served down, and why?

A.—One-third, as the yard touches and chafes them when it is braced up.

Q.—In placing the rigging, how are the shrouds known from each other?

A.—They are all marked with knotted spunyarn; the pair going on first with one knot, the second with two knots. This brings all the odd numbered the starboard, and the even numbered the port side.

Q.—If the dead-eyes are turned in, how may a starboard shroud be known from a port one?

A.—By the seizings being aft, and the end of the shroud inside on both sides of the ship.

Q.—Where would you place your girtline block for rigging lower-masts?

A.—They are lashed to the after part of the trestle-trees. Some lash the girt-line block to the cross-tree that lies next to the after part of the mast-head, considering that the most convenient place. The cross-tree before the mast-head is also used for this purpose.

Q.—How, and in what order, are the shrouds placed on the mast-head?

A.—The bolsters having being well parcelled and tarred, are put on; the starboard foremost pair of shrouds put on first; then the foremost pair on the port side; then the second pair on the starboard side, and so on, alternately, working aft: and the stay on, over all, outside and close down. The seizings of each pair should be kept clear of each other, and by standing in the channels or on the rail, I

should see if the seizing aloft bears in a parallel direction between the two lower dead-eyes which the shrouds will be set up to.

Q.—In placing the rigging, how are the shrouds sent aloft?

A.—Bend the gantline on to the shroud, sufficiently below the eye seizing, to allow the eye to go over the mast-head when the bend is at the block, stop the gantline along the upper part of the shroud with three or four stops to the end of the eye. "Sway away." Cut the stops in the top as they come to the block, and when the bend is at the block the men in the top place the rigging on the mast-head.

Q.—How is your forestay fitted?

A.—With a fork and two lashing eyes, which are lashed together abaft the mast-head, with a roso lashing.

Q.—Where do the two legs of the forestay come up?

A.—Away of the trestle-tree ends, underneath the foremost cross-tree leg of top.

Q.—How does the forestay set up away the bowsprit?

A.—Some old-fashioned ships set up with dead-eye and lanyard, but the neatest way of setting up the lower stays is by reeving them *down* through a bull's eye, with tarred parcelling upon the thimble, and setting them up on their ends, with three or four seizings.

Q.—How would you stay your mast, supposing the stay sets up with a lanyard?

A.—I would hook one luff-tackle to the mast-head, overhaul it down, put the other luff on the stay, allowing sufficient drift to stay the mast without fleeting; then hook the lower block of the latter tackle on to the lanyard of the stay, and hook the lower block of the mast-head tackle to the fall of the other tackle, and then haul away.

Q.—How would you set up a forestay with lashing eyes abaft the mast?

A.—Get a tackle from the mast-head on to the bowsprit, and heave the mast well forward. Get two smaller tackles from the after part of the trestle-trees on to the stays to light the slack in. Pass the lashing from both ends and heave the turns tight with a Spanish windlass. If the two stays are frapped together, one tackle it sufficient.

Q.—Where are the mainstays set up?

A.—They are now frequently set up to strong bolts in the deck.

Q.—In setting up the lower stays, why do you pull upon both ends of the lanyards?

A.—To prevent undue strain on one part.

Q.—State how you will turn in lower rigging, whether with or against the lay of the rope, and why?

A.—With the lay of the rope; turning in against the lay would open the lay and let the water in.

Q.—How is a dead-eye turned in, or secured to a shroud ?

A.—Having parcelled the score of the dead-eye, and hove the shroud taut round it, if right-hand-laid rope it is turned round the dead-eye *right-handed* or *with* the sun, and *against* the sun if hawser-laid; then pass the throat-seizing with nine or ten turns, the outer turns being slacker than the middle ones. Pass quarter-seizings half way to the eye, and then the end seizings and cap, the shroud well tarred under the cap.

N. B.—Wire rigging is generally spliced in; but when it is turned in, wire seizings are used.

Q.—How do you turn in cutter stay fashion ?

A.—The dead-eye being placed to the mark, the end is passed round it as before, but instead of being secured with a throat seizing, the end is passed round the standing part, and to the part round the dead-eye with a round-seizing, and another on the end round the dead-eye.

Q.—State how you reeve lanyards ?

A.—I would reeve the end of the lanyard through the hole of the upper dead-eye nearest to the end, and stop it with a Matthew Walker knot to prevent its slipping; the other end is passed through the hole of the lower dead-eye, and returning upwards, is rove through the middle hole in the upper dead-eye, and next through the middle hole of the lower dead-eye, and lastly, through the foremost hole of both dead-eyes.

Q.—Next proceed to set up your lower rigging ?

A.—Clap a salvage-strop on the shroud, well up, to this hook the single block of a luff-tackle; the double block to a blackwall hitch in the lanyard; the fall is then made fast to the hook of the main-tackle with another cat's paw or blackwall; reeve the tackle fall through the leading block, and pull up, the lanyard being well greased to make the whole slide with ease through the holes in the dead-eyes. When the rigging is set up for a full due (which is when the masts are stayed forward and the stays all set up), the lanyard is first nipped, or stopped, and the end passed between the throat-seizing and the dead-eye with a hitch, then brought round all the parts in turns to expend the lanyard, and the end is well stopped to its own part with spunyarn. The ends of the shrouds are then cut square and capped, and the mats laced on.

Q.—How, and where, is the lower rigging secured ?

A.—By lanyard rove through dead-eyes in the channels, and others in the rigging; or, sometimes, it is set upon its end.

Q.—After setting up the rigging, how is the end of the lanyard secured ?

A.—There are various methods of doing so; a very general practice is to pass the lanyard under the throat-seizing.

Q.—Where is the standing part of the lanyard of a shroud secured?

A.—To the upper dead-eye, a knot being made on the end.

Q.—Why is the standing part of the lanyard rove first through the after hole of the dead-eye, and on the port side?

A.—Because the end of the shroud is on that side of the dead-eye; when setting the rigging up, the most strain is on the other parts of the lanyard at the side of the dead-eye that the shroud comes round. The part nearest the purchase, must, therefore, be forward immediately under the shroud, or the dead-eye would be turned round.

Q.—With the rigging properly turned in cutter stay fashion, does the nip lie on the fore or the after side of the shroud, and why?

A.—On the starboard side, with the nip aft—port side, forward; ends, on both sides, inboard.

The reason of this is, that rigging should be turned in, as the rope would be coiled down, so that it at once accommodates itself to the bend it would naturally take, and no turns are taken out of the lay of the rope. With left-handed rope the same principle holds good, and the result is necessarily reversed. However, for the sake of uniformity of appearances, both ends are generally turned in alike, with the nip forward.

Q.—When rigging is turned in with the end up, how does the end lie?

A.—With right-handed rope the end will be, on the starboard side, aft; and on the port side, forward; crossing inside.

Q.—In turning in rigging, after forming the knot of the throat, seizing, what is done with the end, and should the end lie outside or underneath?

A.—The end of the throat-seizing is not cut off after the knot is formed, but two or three feet are left and expended round the shroud below the seizing: for, if cut off, there would be no end to work with on turning the rigging in afresh.

Q.—State the advantages and disadvantages of turning in cutter stay fashion?

A.—The cutter stay plan has the advantage of holding well, and it admits a sail when set upon a rope to be hauled down; but on the other hand, it is weaker than the main part of the rope—about one-tenth—principally caused by the compressure of its own running-eye, which reduces the sectional area of the substance at that spot, and renders the rope less durable.

Q.—Of the three ways of turning in rigging, which is the strongest—end up, dead eye spliced in, or cutter stay?

A.—By experiments on the three different plans, it has been found that under the pressure of a breaking strain, a shroud first gives way at the splice. The next weak point was found in the cutter stay plan, at the nip. The old plan broke out at the main part of the rope, at the maximum strain, which, when the seizings are carefully put on, is therefore the strongest.

Q.—How would you rig a bowsprit ?

A.—In modern merchant ships, all collars for stays, bobstays, &c., are of iron work, and fitted before the bowsprit is put in ; fit the ridgeropes, pass the gammoning, set up the bobstays, and shrouds, and frap the gammoning.

N. B.—Iron bowsprits are now generally secured with an iron gammon screwed down.

Q.—How do you get the bowsprit cap on ?

A.—Rig a stage under the bowsprit, and have a studdingsail-yard rigged up alongside the bowsprit with a block and line. Bend on the cap and send it out and knock it on—that is, if it is too heavy to put on by hand.

Q.—How would you lay the topmast alongside ?

A.—With its head forward.

Q.—State where you would lash your top-block, and describe the operation of lashing it ?

A.—The top-block is lashed to the head of the lowermast, around the hook, with a lashing long enough to allow the block to hang free.

Q.—How do you send up a topmast ?

A.—Having lashed a top-block to the head of the lowermast, reeve a mast-rope through it from aft forward, and bring the end down through the trestle-trees and reeve it through the sheave-hole of the topmast, hitching it to its own part a little below the topmast-head, and stopping both parts to the mast at intervals. Snatch the rope and sway away. As soon as the head is through the lower-cap, cast off the end of the mast-rope, letting the mast hang by the stops, and hitch it to the staple in the other side of the cap. Cast off the stops and sway away.

Q.—How would you get the lower-cap on ?

A.—The lower-cap, if heavy, is generally placed on after the topmast is pointed through the top or, by means of a spar lashed to the mast-head, and separated therefrom by a wedge, the thickness of the cap. To place the cap on by the former method, send it into the top by two girtlines, which being rove and overhauled down, are bound to the forepart of the cap and stopped to the bolts ; then “ sway away,” and when up, place the round hole of the cap over the square hole of the trestle-trees for the topmast to reeve in : stop the cap to the sheave-hole of the topmast as the mast goes up ; when high enough, place it on the lowermast-head, casting off the lashing that stopped it to the sheave-hole of the topmast : the cap is then driven close on to the lowermast-head.

Q.—How do you send the topmast cross-trees up ?

A.—If the cross-trees are heavy, they may be placed in the follow-



ing manner:—Sway away until the topmast-head is a few feet above the lower-cap; send up the cross-trees by girtlines, and let the after part rest on the lower-cap, and the forward part against the topmast; lower away the topmast until the cross-trees fall into their place, and then hoist until they rest on the shoulders.

Q.—Rig a topmast in full detail?

A.—I would tar the bolsters and put them on; then place the span for *Gin-blocks*. Some prefer chain spans to shackle the iron-bound block to. The most approved method is an iron plate with a hook on each end, which lies across the trestle-trees. Next, put over the mast-head pendants; then follow the strops with thimble in for standing part of the tyes. The *Shrouds* are swayed up and placed over the top mast head; the first pair on the starboard forward, then the port, and so on with the other pairs. *Backstays* are hoisted and placed the same as shrouds, starboard pair first; stays are swayed up and lashed abaft the topmast-head. After that the strops for the topsail *lifts*, and the studdingsail halyard *pendants*.

Q.—How are the topmast stays set up?

A.—Set up to the knight-heads with a lanyard and a luff-tackle, the double block out on to the bee with a strop round the stay, and the single block hooked on to the lanyard.

Q.—How is the topmast cap sent up?

A.—They are swayed up by girtlines, which are to be lashed well up to the topmast-head for the purpose. Overhaul down before all the foremost ends, and secure them to the foremost bolts in the cap; stop them to the centre ones, and also to the square hole in the after part, then sway the cap up; when near up, cut the after stops, sway it upon the topmast-head, and the man aloft places it on, then beats it down firmly. The girtlines are unlashd and got down, and the topmast hove up and fidded.

Q.—Your foreyard alongside, proceed to get it on board?

A.—I would overhaul the mast-rope, and bend it on amidships, and stop it out to the yard-arms. Sway away, and cast off the stops as the yard comes over the side, and get the yard across the bulwark.

Q.—Proceed to rig it?

A.—Fit clew-garnet, reef-tackle, and leech-line blocks. Rig the yard-arm, thus:—First the grummet, then the caring-strop, foot-rope, brace-pendant, and lift.

Q.—Now send it aloft?

A.—Overhaul the purchase down, and hook the lower purchase-block to the slings of the yard. Take the lifts aloft and reeve them. Then sway up, steadying the yard by the lifts as it goes up. When high enough reeve the trusses, shackle the slings, and send the purchase down. Haul taut the lifts and braces.

MAKING AND TAKING IN SAIL, &c.

Q.—How would you set a foresail ?

A.—Loose the sail and overhaul the buntlines and leech-lines. Let go the clew-garnets and overhaul them, and haul down on the sheets and tacks. If the ship is close-hauled, I would ease off the lee-braces, slack the weather-lift and clew-garnet, and get the tack well down. When the tack is well down, sharpen the yards up again by the brace, top it well up by the lift, haul aft the sheet, and then haul out the bowline.

Q.—State how you would take a mainsail in ?

A.—I would man the weather clew-garnets and buntlines, ease off the main-sheet a fathom or two, and belay ; I would then slack away the main-tack, and haul up the weather clew-garnet and buntlines, taking care to have the sail kept full. When the weather-clew is up, and as much of the buntline as can be got, then luff the vessel as close to the wind as possible ; ease away the main-sheet, and haul the lee clew-garnet up, and buntlines at the same time. I would haul a fore-sail up in the same manner.

Q.—How would you bend a course in blowing weather ?

A.—I would stretch the head of the sail across the deck as near as possible ; bend the gear, then bring the leeches of the sail as near where it should haul up on the yard as I can ; then stop my sail well about every two or three feet ; besides the yard buntlines, have one in 'midships of the sail. When ready, man altogether, and run it up the yard ; then the sail may be bent and furled with very little difficulty.

Q.—You are under double-reefed topsails, and you want to shake the double-reef out, what orders would you give to the men before going aloft ?

A.—To haul the reef-tackles taut, slack the halyards a little, and be sure to haul well taut the reef-points of the first reef, before letting go the earring.

Q.—How would you reef a course ?

A.—Haul up and spill the sail, as if you were going to furl it ; then haul out the reef-tackles and reef it.

Q.—How would you close-reef a topsail, by the wind, when the course is set ?

A.—Clew the sail snugly up, haul out the reef-tackle, brace the yard by, and reef ; then fill the yard and set the sail.

If you start the sheets only, the sail is like a balloon, and you endanger the men on the yards.

Q.—In bending and unbending a topsail, what ropes are bent and unbent ?

A.—Bunt-lines, clew-lines, sheets, and reef-tackles.

**Q.**—Suppose you are under double-reefed topsails, jib, and spanker, and you split your main-topsail, proceed to shift it; state how you will gather the sail in, furl it, and pass your sea gaskets round; state, also, how you will send the old sail down; what ropes are to be used?

**A.**—Pass the gaskets round the sail to keep it quiet, then cast off the reef points, the robands, and the first and second reef-carings at the yard-arms, and with them make the sail fast with a marline hitch from the yard-arm, in; cast off the standing part of the reef-tackles, and put a knot in them; haul taut on deck, ready to slack away; unbend the buntlines and sheets, and with a spare earing lash the clew, head, and buntline cringle altogether, passing a turn or two round the sail; if the ship is by the wind and lying over, take a small rope out to the lee yard-arm, and bend it to the reef-tackle cringle to haul the sail up clear of the stay; then cast off the gaskets and earings; slack away the lee reef-tackle; haul the sail to windward of the stay; cast off the 'midships stops; lower away the clewlines; when clear of the top, lower away the weather reef-tackle and clewlines, and gather the sail in on deck.

Long buntline spans will here be found useful for passing round the bunt and through the clews.

**Q.**—Get the new sail up; describe the bending, the gear, and reefing the sail; also state how you will make it up on deck to prevent wind getting into it?

**A.**—Reef by the foot which is done in the following manner:—Stretch the close-reef of the sail taut along the deck; take the clews as near where they will haul up on the yard as I can; trace the clews down clear to the foot of the sail; then haul the foot of the sail taut, without moving the clews out of their places, then gather the foot as near the close-reef as possible; then tie the close-reef round the foot; then the second reef, until all the reefs are expended round the foot of the sail; minding to keep the reef-knots as near at hand as possible, to be ready for casting off; by this means the sail may be bent without exposing more than one reef at a time, until the close-reefed sail is set.

A topsail might be sent up by the buntline and weather-clewline.

**Q.**—When close-reefing your main-topsail and running before a heavy gale of wind, what would you take into consideration?

**A.**—Bring the wind on the quarter, and take into consideration the way the sea was running.

**Q.**—You are sailing under double-reefed topsails, and you want to shake one reef out, how will you proceed?

**A.**—Haul taut the reef-tackles, then lay aloft and cast off the points, beginning from the bunts, tightening all the *first* reef-points, then ease away the earings, seeing that the first reef-carings are secured.

Q.—How would you reef the topsails ?

A.—Lower away the halyards, haul in the weather-brace until the sail shivers ; take in the slack of the reef-tackles as the yard comes down, to keep the earings clear, haul the weather reef-tackle out first, then the lee reef-tackle and buntlines, then lay up and reef the sail ; attend as the yard goes up to ease off the weather-brace, when the sail is set, haul in the lee-brace.

Q.—How would you close-reef the topsails, going large with a heavy sea on ?

A.—Put the ship dead before the wind, clew down the fore topsail yard, and lay it and the fore-yard square ; haul out the reef-tackles ; haul up the buntlines and reef the sail while becalmed by the main-topsail ; when the fore-topsail is reefed, let go the gear and hoist it up ; then brace up the main and main-topsail yard (two good hands at the helm and look out she does not broach-to, as the main-yard goes forward), then one watch haul taut the weather-braces—the other, man the *lee reef-tackle* and buntline, and stand by to haul out when the sail shivers ; when the gear is manned, put the helm up, and bring the wind a little on the other quarter, so that the main-topsail is shivering by the *lee* ; haul the reef-tackles well out, and bouse the buntlines taut up ; and lay aloft and reef.

By laying the yards as above, the main-topsail will shiver the wind two and a-half points on the quarter—the sea following the ship and the head-yards being squared will make her steer ; if you try to brace the main-topsail by, so as to shiver the weather-leech, you will have to bring the wind abeam, and the sea will fill the decks, and probably sweep everything off them—besides, the foresail is whole and it would not stand. If you clew the sail up, and brace the yard by, you could then reef it, but you give your crew extra work, and run the risk of splitting the sail, either in clewing up or in setting.

Q.—What is the advantage of a studdingsail bend ?

A.—The advantage is, that it lies close to the yard, and, consequently, permits little or no drift between the yard and blocks.

Q.—How is the heel lashing of a topmast and topgallant-studdingsail-boom secured ?

A.—That of a topmast-studdingsail-boom is secured round the quarter iron ; of a topgallant-studdingsail-boom, through the quarter stop and round the jackstay.

Q.—State how you secure the fore-topmast-studdingsail-boom ? and state how far out on the studdingsail-yard you will bend your studdingsail-halyards, and why ? What bend do you make ? Also state a good preventure, blowing fresh, against a topmast-studdingsail blowing before all, in setting the sail ?

A.—Haul taut the boom-brace and topping lift. I would bend the halyard 8 or 9 inches outside the middle of the yard, so as to keep the outer leech taut.

Q.—Suppose you split your foresail, proceed to shift it ; and state

what precautions you will take to keep the sail from blowing to leeward in sending it down ?

A.—Pass a few spare gaskets round the sail, and take the bights of the bowlines down to windward to haul in the sail with.

Q.—Brail up a spanker in a squall ; what brails to be best manned, and why ?

A.—In brailing up a trysail or driver, the lee-brails should be manned best, and the slack only of the weather ones gathered in, so that the sail may be kept shaking.

Q.—What is to be done with the cross-jack brace, and why ?

A.—The weather-lee brace must be eased a little lest the yard-arm should go through the spanker.

Q.—For the safety of the ship and crew, what precautions are necessary before leaving the docks to proceed to sea ?

A.—I would see the hatches well battened down and the deck cleared up ; that the anchors were a-cock-bill ; that a sufficient quantity of cable was ranged on deck and overhauled over the windlass clear for running ; that the cable was shackled to the anchor and clenched below ; that the shackles were all right, wheel chains clear, tiller tackles ready, put the helm hard over each way, gear coiled down and ready for running, and that the pumps were in order. I would overhaul the binnacle for nails, &c., and see that the compasses were in the binnacles ; that the life-buoys were in their places, boats with their gear properly stowed, keeping one ready for carrying out a warp if necessary ; that the tow-ropes and some spare lines were at hand and ready for use ; that the log lines, log glasses, and lead lines were all right and ready for use ; that the breast rope was fast in its place.

Q.—You come on deck to take charge of the watch ; what would you do ?

A.—See what sail was set, inquire what weather there had been, when the ship was pumped, what orders the captain had left, the course the ship was steering, see the wheel relieved, the look-out set, and, if at night, see that the lights were all right, and keep a good look-out myself.

Q.—How would you set a topmast studdingsail ?

A.—Haul well taut the weather fore-lift and make it fast, steady taut the boon burton and boom-brace and belay. Bend on the halliards one third from the inner yard arm, bend on the tack, and make the down haul up.

Q.—How would you set a main-top gallant sail ?

A.—Loose the lee-side first, then the weather side, let go and overhaul the buntline and lee clewline. Haul home the lee-sheet, then the weather sheet. Let go the lee-brace, hoist away on the halliards, slack the weather brace as the yard goes up, trim the yard.

Q.—How would you take in a top-gallant sail?

A.—Let go the halliards, start the lee sheet, haul in the weather brace to spill the sail, haul up the lee-clewline and buntline, the weather clew and buntline, stow the sail and trim the yard.

Q.—How would you take in a foresail, if blowing hard?

A.—Haul taut the lifts, man the weather clew garnet, leech-line, and buntlines, ease off the fore-sheet a little. Let go the bowline, slack away the tack, and haul up the weather clew garnet and buntlines, ease away the fore-sheet and haul up the lee-gear.

Q.—The wind moderates, proceed to set in.

A.—Loose the sail, haul aft the slack of the sheet, board the tack, haul aft the sheet, and haul out the bowline.

Q.—How would you take in a topsail in a gale of wind?

A.—Slack away the weather-sheet. Haul the weather clewline close up, also the buntlines as much as possible, man the weather brace and lee-clewline. Let go the lee brace, and as the lee-sheet is started, haul in on the weather brace, and haul up the lee-clewline and buntline.

Q.—How would you stay a ship?

A.—See all clear for about. Station the hands, keep her clean full for stays, put the helm a-lee, ease off the jib and fore-sheets, and when the sails shake, raise tacks and sheets, and when within a point and a-half of head to wind, haul round the mainyard, board the main tack, and haul aft the main sheet, haul over the head sheet when the wind comes on the other bow; when full, right the helm, let go and haul, down tack and haul aft the sheet, and as she gathers headway, brace sharp up, haul out the bowlines and stand on.

Q.—You have just tacked ship, she falls off; there is a ship on the lee bow, what would you do?

A.—Let go the head sheets, and the fore sheet. If she still falls off, check the fore brace, haul the head sails down, and haul in the weather fore brace.

Q.—In tacking ship, when do you right the helm?

A.—As soon as the afteryards are swung.

Q.—The ship is in stays and loses her way, what do you do with the helm?

A.—Shift it over the other way.

Q.—The ship is on the starboard tack, and has stern-way, what would you do?

A.—Put the helm a-port.

Q.—You are putting the ship about, and you haul the mainyard, and she will not stay, how would you wear her short round?

A.—If she has stern way, keep the helm down, brail up the spanker, haul the mainsail up, square the mainyard, shiver the

*cro'jack* yard ; the moment she gathers headway put the helm hard up, and when she is before the wind, ease off the jib sheets and square the foreyard ; when the wind comes near the quarter, haul the mizzen out and keep the afteryards full ; when she comes to, brace up the afteryards, set the jibs and trim the head-sails.

Q.—In putting the ship about, when do you haul aft the jib sheets ?

A.—As soon as the jibs will fill ; that is, when the wind is just on the other bow.

Q.—In putting the ship about, what is to be done before putting the helm down ?

A.—See all clear for about, and keep her clean full for stays.

Q.—You have a ship on the lee beam, the wind is very light, and you are sagging down upon her, you have your helm down and she will not come to, how would you bring her to ?

A.—Haul down the head-sails, spanker boom-sheet to windward, and haul on the weather fore-brace until the sail shakes.

Q.—You are on a lee-shore with no anchorage, your ship will not stay, and you have no room to wear, how would you act ?

A.—Put the helm down, ease off the head sheets, when the sails shake let go the tacks and sheets and gather in the lee ones, throw the yards aback. When she has stern-way, shift the helm and let her come round on her heel.

Q.—The wind is on the side and veers well aft, how would you trim your yards and prepare to set your stunsails ?

A.—Round in the weather mizzen, main, and fore-braces, see that the lee-braces and lifts are well taut, set the weather stunsails first, then the lee stunsails.

Q.—You are running with square yards, with the mainsail hauled up snug, and the head sails down, the wind hauls forward, what would you do ?

A.—Set the head sails, forward the foreyard, trim the afteryards, trim the foresail, and haul the lee clue of the mainsail aft.

Q.—You are laying too with little or no sail, how would you bring the ship's head round ?

A.—Watch when she falls off, put the helm up, square away her afteryards, and wear her round ; taking care to bring her to when the sea is smoothest.

Q.—Your ship is close hauled on a wind, and you want to haul the jib down ; how would you do it ?

A.—Put the helm up and keep her off two or three points, and when all is ready, let go the halliards. When the sail is down, ease off the sheet until the sail is gathered on the boom, and when stowed and the men off the boom, bring the ship to the wind again.

Q.—How would you wear a ship under a mainsail ?

A.—Set the foretopmast staysail for an off sail, watch when she falls off, put the helm hard up, raise the weather clue of the mainsail and square in the after yards. When before the wind shift over the stay sail sheet and get the weather tack down as low as possible, watch the smooth and bring her to.

Q.—You are riding in a gale of wind ; how could you tell if the ship is driving ?

A.—By attending to the deep-sea lead over the side, and noticing if the ship fell astern of it.

### TAKEN ABACK, SQUALLS, REEFING, &c.

Q.—You are going up a narrow channel on the starbord tack North, and the wind suddenly shifts to the NNE. ; what would you do ?

A.—Put the helm hard up, brail in the mizzen, ease off the main sheet, and get in the sails as fast as possible, taking in the royals and topmast-stunsails, then the lower stunsails and top-gallant sails, and if necessary, reef the topsails.

Q.—The wind is WSW., and you are steering E., and you want to take a reef in the fore and main topsails, proceed to get them in as quick as possible.

A.—Let her go before the wind, lower the fore topsail yard, steady the braces taut, haul out the reef tackles, lay aloft and reef, haul in the starboard main topsail brace (first letting go the halliards), and spill the sail, taking in the slack of the reef-tackles, haul them out as far as you want them, haul taut the buntlines, lay aloft and reef.

Q.—You are steering east, the wind is WSW., and you are under double-reefed fore and main topsails and reefed foresail, how would you proceed to close-reef the topsails ?

A.—Keep the ship dead before the wind, close-reef the fore topsail and set it, bring the ship to her course, round on the weather main and main topsail brace until the sail shakes, let go the halliards and slack the sheets, haul out the reef tackles, steady tight the buntlines, and lay aloft and reef. To set the sail, haul home the slack of the sheets, and take a pull at the halliards to ease the lifts.

Q.—How would you close reef a maintopsail with the wind on the port quarter, without altering your course ?

A.—Let go the lee brace and brace the yard to the wind, so as to shiver the sail, let go the halliards and haul out the reef tackles, and haul taut the buntline, pass the earing from aft over the yard and down through the cringle.

Q.—You are running with the wind on the port quarter, the fore



topsail is double reefed, and the foresail is set, proceed to reef the main topsail.

A.—Haul in the weather main brace and topsail brace, and let go the topsail halliards. When the yard is down on the cap, ease off the sheets, haul out the reef tackles, haul taut the buntlines, lay aloft and reef.

Q.—When close-reefing your main topsail, and running before a heavy gale of wind, what would you take into consideration?

A.—Bring the wind on the quarter, and take into consideration the way the sea was running.

Q.—How would you shift a close-reefed main topsail in a gale of wind?

A.—The new sail should be first stretched along the deck, clews amidships, and reefed on the foot, ready for sending aloft. Set some of the after sail (the spanker, main trysail, or mizzen staysail), to keep her from falling off, clew up the main topsail, cast off the reef points, and reef by the foot, unbend the gear and send the sail down by a gauntline, and weather reef tackle. Send the other sail aloft by the gauntline, hook the reef tackles to the sail and haul them out, bend the sail and reef to the yard.

Q.—You are under double reefed topsails, and you want to shake the double reef out, what orders would you give to the men before going aloft?

A.—To haul the reef tackles taut, slack the halliards a little, and be sure to haul well taut the reef points of the first reef, before letting go the earing.

Q.—Proceed to let out three reefs in your topsail.

A.—Settle the halliards, haul out the reef tackles, and haul the buntlines taut, lay aloft and shake out the reefs, and see all clear for hoisting. Down from aloft, set the sail, and haul taut the brace.

## ACCIDENTS.

Q.—Your ship is on a wind; it is blowing fresh, and you discover that your bobstays are carried away, what would you do?

A.—I would immediately put my helm up and keep the ship off the wind to ease the bowsprit, then get a length of my stream cable and take a clove hitch with it round the bowsprit, and pass each end in through the hawse-pipes, and set them up to the windlass, or cross them under the forefoot, and lead in by main chain, and bowse well taught, then haul the ship to the wind again.

Q.—You are carrying whole canvas on a wind, and your bowsprit is sprung; what would you do?

A.—Get the ship before the wind, get a hawser from the topmast-

head, and another from the lowermast-head in through the hawse-pipes, and set them up to the windlass, rig in the flying jibboom, and the jibboom, and send down the fore topgallant yard and mast. If necessary, fish the bowsprit with the flying jibboom or spare spars, reeve the stays through the hawse-pipes and set them up.

Q.—Your bowsprit is carried away, how would you secure the foremast ?

A.—By a hawser from the mast-head through the hawse-pipes well parcelled in the chafe, and set up to the windlass, clear away the wreck and reeve the stays through the hawse-pipes and set them up.

Q.—Suppose you were to carry away the truss of your foreyard, how would you proceed to secure it ?

A.—Fit two chain strops round the yard with thimble in each strop, another piece to go round the mast with a round turn, well parcelled, and the two ends to reeve through the thimbles ; set up to the after part of the trestle-trees with a gun tackle purchase. Put a large mat between the mast and the yard to prevent chafing.

Q.—You are sending your fore-yard aloft at sea, and the ship is rolling ; what precautions would you take to prevent the yard from swinging about ?

A.—Get a gun-tackle purchase to the fore-stay, which will steady the yard when going up ; and keep it clear from the mast while trussing it ; or get a couple of rolling tackles and hook them on to the strops on the quarters of the yard, hooking the lower blocks into the ship's sides, the port tackle to the starboard side, and the starboard tackle to the port side.

Q.—Your ship is on a wind close hauled, with all plain sails set, and the topmast backstays are carried away ; what is the first thing you would do ?

A.—Let go the royal, topgallant, and topsail halliards, put the helm up and bring the wind on the other side.

Q.—Suppose your fore-yard arm carried away at the topsail sheet-block, and you wanted to make it do till your arrival in port ; what would you do ?

A.—Get three stunsail booms as far out as the original yard arm, and lash them to the yard, lash a block for the topsail sheets, put the brace and lift over the three boom ends, and bend the sail to the yard arm.

Q.—What would you do if the mast-head cap worked loose ?

A.—Wedge it tight again if possible. If I could not do so, I would pass a good lashing round the topmast and lowermast-head, and frap it well between the doublings of the mast.

Q.—Suppose the fore-topmast is sprung just above the cap ; how would you secure it ?

A.—Lower it down till the part sprung was below the cap, and either hang the topmast or cut another fid-hole. Shorten the stay, backstays and rigging.

Q.—Your weather main-topsail-brace gives way, what would you do to get the yard down?

A.—I would ease the lee-sheet to spill the sail, luff the ship to the wind, and lower away the halyards.

Q.—If the lower brace should carry away?

A.—I should lower the topsail, hauling in the weather brace, if needful; I should ease off the sheet of the course (short of splitting the sail), and let go the tack; for the first important duty is to save the yard. If this accident occurs forward, I should have the weather helm attended to.

NOTE.—“One instant might break the brace, the next would break the yard; but there would be just time enough between them for a quick, ready officer to start all the principal gearing that would relieve the spar.”

Almost all large ships now have double topsail-yards, with braces on each, making the yards more secure; therefore, it will seldom be necessary to start the topsail-halyards, on account of a lower brace breaking. Starting the topsail-sheet would cause confusion to little purpose.

Q.—If your topsail-brace and parral are carried away, how will you act?

A.—If the weather-brace should be carried away when the parral goes, and the weather yard-arm flies far forward, it will then be advisable to put the helm up and bring the wind on the opposite quarter, keeping the yards braced up as before on the mast to which the accident has happened, and steer the ship so as to let the wind blow along the sail of the disabled yard, until it gently returns to the mast. When done, lash the yard on each quarter to the topsail rigging and the topsail tye-blocks well round the mast; then fit the weather-brace and parral.

Too much care cannot be taken in keeping fast the topsail-sheets, as upon that will depend much of the safety of the mast, yard, and rigging, as the heavy flapping of a topsail will be likely to shake everything to pieces.

Q.—If the topgallant-brace and parral carry away?

A.—I should brace by the lower and topsail-yards, and if necessary, sufficiently touch the ship with the helm, to throw the topgallant-sail slightly aback.

Q.—Suppose you were in a ship, on a wind, and you lost all your sails, and you wanted to get the ship before the wind, what would you do, ship not steering?

A.—Pay a hawser out of the lee-quarter, with a spar attached to it.

Q.—Lying-to in a storm, your mainmast goes over the side?

A.—Wear round if you can, and bring the wreck to windward, to prevent it injuring the ship; and get clear of it as soon as possible.

Q.—You are totally dismasted, and consequently quite unmanageable; what will you do to keep the ship from foundering by the sea striking her astern or amidships?

A.—Rig a sea-anchor with three spars, in the shape of a triangle, and lash a sail across it; at one corner sling a weight proportionate to the size of the spars; span it, bend a couple of your largest hawsers to the span, launch it overboard, and ride by it until jury masts are rigged. If unable to move about on deck to do this, let go one of the bower anchors, with a hemp cable attached, and veer away a long scope, which will, in some measure, steady the ship by bringing her head towards the sea.

Q.—One vessel in tow of another; the headmost one puts her helm down to go round: how does the other proceed?

A.—When the ship ahead puts her helm down to go round, the ship in tow puts her helm up, and always endeavours to keep directly in her leader's wake.

Q.—Your fore-topmast is sprung; proceed to shift it; give a detailed description of the process. State how you will get the cross-trees and rigging off in a mass, and point the new mast through, without stripping the mast, in detail?

A.—Let the topmasts come down, having cross-trees, rigging, &c., on the lower cap, put a stop or two round to keep them on, if necessary; but their own weight will generally suffice.

Q.—Suppose the parral of your topgallant-yard carries away?

A.—In such a case much of the whole force and weight of the yard and sail are thrown at the mast-head, and the topgallant-mast is endangered by it. If the ship is by the wind, I should brace the topgallant-sail aback immediately, and lower it at the same time; but, if before the wind, I should immediately brace by and lower the topgallant-yard. I should take care that the topgallant sheets are not started, as that would much endanger the mast by the sail forcing itself against, and perhaps entangling itself round the topgallant-stay.

Q.—You carry away the parral of the main-topsail yard, state what what will you do to get the yard secured?

A.—A topsail-yard parral may be repaired in the same manner, if carried away in moderate weather; but, if blowing hard, with double or close reefed-topsails, the returning weight of the topsail-yard, and force of the sail when thrown aback, might endanger the mast, yard, or lee-topmast rigging; as however taut the weather-topsail-brace may be when the parral is carried away, and the ship by the wind, the yard will surge over to leeward, and consequently swing from the mast. In either case, first spill the sail without its flapping, unbend the clewlines from the clews. If a topgallant-sail, make the ends fast on the after trestle-trees. If a topsail, lash the clewline blocks on the after part of the topmast cap, crossed; clew down the yard, using braces, and secure the parral afresh.

Q.—If the trestle-trees were carried away and you were afraid of the topmast coming down, how would you act ?

A.—I would reeve as stout a rope as the sheave-hole would permit through it, splice a thimble in both ends, and set it up as tight as possible to the eye-bolts in the cap, or to the cap itself.

Q.—When obliged to cut away the masts, which rigging would you cut away first ?

A.—I would cut the lee-rigging away first, then the stays, and afterwards the weather-rigging. If I was riding head to wind, I would cut away all the rigging on both sides, except the two foremost shrouds ; then cut the stays and foremost shrouds together, and stand by for a run forward as the masts fall on either quarter.

### MOORING, UNMOORING, GETTING UNDER WEIGH SLIPPING, &c.

Q.—How would you come to in the Bay with light SW. wind, the tide setting NE ?

A.—Take in all sail except the spanker and mizzen topsail, starboard the helm, and when head to wind, let go the anchor.

Q.—What would you do then ?

A.—Hold on till she had sternway, then pay out as much chain as she required, clew up the mizzen topsail and brail up the spanker.

Q.—How would you moor your ship with forty fathoms each way ?

A.—Get all the necessary chain on deck, that is about eighty-five fathoms on the riding cable, let go the anchor and pay out, &c.

Q.—When you have paid out forty fathoms, suppose you cannot go any further astern, how would you lay out your other anchor ?

A.—Carry out a kedge with a stout warp for a hauling line, lower your anchor down to the stern of the long boat, making it fast with a good slip rope through the ring, or below the stock, and round the thwart. Get as much chain in the boat as it can carry, having good stoppers on the thwarts to keep it from running out too fast, haul out and let go. *Note.*—Be sure to buoy your anchor, as most likely you will have to pick it up with your boat when you get under weigh again.

Q.—How would you trip an anchor ?

A.—I would take the long boat to the buoy, put a luff tackle on to the buoy-rope, and as soon as the anchor is tripped, heave away on the cable aboard the ship.

Q.—Suppose your buoy-rope breaks, how would you pick up the anchor ?

A.—I would under-run the chain by the long boat.

Q.—How would you lay a kedge in a boat to carry it out ?

A.—I would lay the stock over the stern, having the flukes in the boat on a spar, so as to be easily thrown overboard.

Q.—How would you carry out a bower anchor by the long boat ?

A.—Few ships have a boat that would do to hang the anchor over the stern. I would, therefore, get a short, stout spar across the boat, lower the anchor by the cat-fall, getting a slip-rope round the crown as it comes down ; haul it under the bottom of the boat as much as may be safe, then get a ring-rope over the stern. The weight of the anchor would then be on the body of the boat. Care must be taken in letting it go, that all the ropes are clear.

Q.—In getting under weigh, with a vessel on your port quarter, with a head wind, would you cast *to her* or *from her* ?

A.—I would cast to her and go under her stern, as square-rigged vessels generally get stern-way on them.

Q.—You are lying off Partridge Island, and want to get under weigh, your anchor is a-peak, but there is a vessel on each quarter so that you cannot clear by canting when under sail ; what would you do, the wind being right off the land ?

A.—I would run out a kedge on my starboard bow, and bring the kedge rope aft on my starboard quarter, trip my bower and swing to the kedge before making any sail. When swung to the kedge, make sail and run between them before the wind.

Q.—In the same position, with the wind blowing very hard, how would you get under weigh ?

A.—Trip the anchor and dredge between them, as there would be a risk of the warp parting when swinging to a kedge.

Q.—Proceed to moor your ship, say in the Bay of Fundy, with a clear hawser to the SE.

A.—I would have the heaviest chain in the direction of the strongest wind, and the other anchor in the opposite direction.

Q.—Suppose you are lying in St. John Harbour, with the wind at NW. ebb tide, you have both anchors down, you wish to get under weigh, which anchor would you lift first ?

A.—I would get my lee (starboard) anchor up first ; because if I tripped my port anchor first, the ship would fall to leeward, and I would be very apt to hook and foul my starboard chain.

Q.—How would you moor a ship with a mooring shackle ?

A.—Get the boat under the bows and lower the shackle down with a good rope into the boat. Bend a good hawser to the chain the ship is riding by. Slack up the chain, unshackle it, and shackle on the mooring shackle, repeat the same on the other side.

Q.—You are riding head to wind in light winds, proceed to get under weigh on the port tack.

A.—Heave short on the cable, set the three topsails, topgallant

sails and the mizzen, then brace up the main and crojack for the port tack and the fore yard abox. Heave away on the cable, and as soon as the anchor is weighed and the jibs will take, hoist them. When the after yards are full, let go, and haul the fore yard round and stand on.

Q.—How would you use the helm?

A.—Put the helm-a-starboard till she gathers headway, then bring her gradually to the wind.

Q.—You are lying in a roadstead with the wind two points on the starboard bow, your ship is driving, and there is land on the port bow, you wish to get under weigh and proceed to sea on the port tack, what would you do?

A.—Get a warp from the port-quarter to the riding cable outside the hawse-pipe, heave tight and make fast to the timber heads aft. Buoy the chain. Loose the topsails and double reef them, brace the after yards for the port tack, and leave the fore yard the opposite way or abox. See the chain all clear and ready for slipping, watch the smooth and slip the chain. As soon as she pays off, and the jib will take, hoist it up; as soon as it takes, and the mizzen topsail full, attend the helm, haul round the fore yards, cut the spring and trim her to the wind.

Q.—You are riding with two anchors and no mooring shackle, how would you clear hawse if foul?

A.—Get a good lashing round both chains, unshackle, let the end come down into the boat, pass the end round the other chain the opposite way. Send the end up, shackle, heave taut, and cast off the lashing.

Q.—How will you know a ship is coming end-on to you?

A.—By day, I will see the fore and mainmast-heads in one. At night, the red and green lights.

Q.—How would you tend a ship in a tide-way?

A.—A light ship to leeward, a loaded ship to windward.

Q.—Why?

A.—Because the tide has more effect upon a loaded ship than the wind, and a light ship will not ride to windward.

Q.—Suppose you were riding in the bay, with an ebb tide, and the wind right aft; how would you act?

A.—I would brace the after yards forward on the same side as the ship is sheered, brace the fore yard square, and steer as if under weigh.

Q.—Your ship is lying in Saint John Harbour, with her head North, and the wind N.W., and the weather tide makes; what would you do to swing the ship clear of her anchor?

A.—I would hoist the fore-topmast stysail, haul aft the starboard sheet, and put the helm starboard, and shoot her across the tide,

bringing the buoy on the starboard quarter; and as the tide makes she will drop astream of her anchor. I must not forget to ease the helm as the tide strengthens.

Q.—The tide has made, and you find she will not drop astern of her anchor, the wind being stronger than the tide; the buoy is on the port quarter; how would you keep her clear of her anchor?

A.—Put the helm a little a-port, keep the fore-topmast stay-sail up, brace the fore-yard square, and the after yards to the wind, and watch that she does not break her sheer.

Q.—Suppose you are riding in a calm; how would you keep the ship clear of her anchor?

A.—By heaving her dead short.

Q.—What keeps the rudder in its place when shipped?

A.—The woodlock.

Q.—How do you know a topsail from a course in the locker?

A.—By the number of cringles on the leech.

Q.—How do you bend a jib, blowing hard?

A.—By making it up and sending it out, stowing it on the boom in the usual way, and leaving the luff clear for seizing to the hanks.

Q.—If she carries too much weather helm?

A.—I will brace up the head-yards more, and ease the spanker-sheet.

Q.—If she carries too much lee helm?

A.—I will brace up sharper aft, and take a pull of the spanker-sheet, ease the head sheets, or haul down the flying-jib.

Q.—Ship stranded, proceed to get her off?

A.—First, sound the pumps to see if the vessel has sprung a leak, then sound for the deepest water, lay a kedje anchor in that direction to haul the boat out by, and get out an anchor for heaving her off (having a buoy and buoy rope on the anchor). If the boat is too light, lash a spar on each side of her, and buoy her up with water casks; or otherwise, take two boats, lash a spar across the gunwales, and hang the anchor to the nearest boat—a single block to the ring of the kedje anchor and a whip will be the easiest way of hauling the boat out, or you may lead it to the capstan on board.

Q.—Ship on her beam ends?

A.—Get her up without cutting away masts, if possible, by getting her before the wind, or head to wind. If that cannot be done, cut away the lee rigging first, and nick lee side of masts, leaving a good stump above deck to secure jury masts to; then cut away to windward, &c., making a hawser fast first to the wreck, and ride by it on the weather bow until moderate, then get as much as you can on board again to rig jury masts, &c. To keep the ship from rolling in the trough of the sea when all the masts are gone—if the wreck has



not been secured, take the largest spar you have and bridle it, to the centre of the bridle make fast a hawser, and having first attached to the centre of the spar a kedge, or fifteen fathom of chain to partially sink the spar in the water, pass over on the weather bow, as the vessel will drift quicker than the spar: it is evident this will keep her head to sea.

Q.—In making the land—coming up channel?

A.—Have anchors and chains, &c., all ready, keep clear of lee shores by using the lead freely—especially in foggy weather; also got range of cable laid and warps on deck, and ship's papers ready for entering at Custom House, and official log book ready filled up according to instructions given in that instrument; the papers required for entering the vessel is the ship's register, manifest, bill of health, and light bills, receipted. If not entered within twenty-four hours, penalty—\$500

Q.—How will you rig a jury mast, the ship rolling about in the trough of the sea?

A.—Lay the head of the largest spar I have got, on the taffrail step, the heel against the aft side of the stump of the lower mast, and steady it with guys. Rig the mast head with shrouds, and fore-stay having dead eye ready turned in for setting up, a steady strain both sides as the mast is raised on end with a long tackle from forward on the stay, having a block at the mast-head for the tie, if no sheave-hole; and when erected secure the heel to the stump, get the largest yard and sail I have to fit the hoist; and if a topsail which has too much hoist I can reef it, prepare a rope parral and braces, bend the sail and set it, and get up another jury foremast in the same way, for making all possible sail.

Q.—How would you endeavour to stop a bad leak outside?

A.—If I knew where about the leak was, I would stitch oakum or cotton into a spare square sail, and put it over the side, with lines to draw it (oakum side) to the ship's bottom, and bind it with several turns of small lines round and round the ship's outside—the sail and oakum will then suck into the leak.

Q.—What is the usual rule for finding the length of the lower masts?

A.—Mainmast equal to two and a half times the ship's beam; foremast equal to eight-ninths of the mainmast; and mizenmast equal to five-sixths of the mainmast.

Q.—What length ought the sheers to be?

A.—The length of sheers for taking in lowermasts, ought not to be less than seven-eighths or three-fourths the length of the longest spar; to be taken in, and to be stout enough to stand the weight, or made so by the assistance of other spars lashed alongside the sheers.

Q.—What do pilots' vessels use in a fog on their signal station ?

A.—Pilots' vessels, when to an anchor, upon their signal station shall use a gong every ten minutes.

Q.—When a steamer is laying a telegraph cable, what will she be distinguished by ?

A.—At night she will show two red lights, vertically under the white mast-head light, four feet apart, and of the same construction and character as of the before mentioned mast-head lights. By day, between sunrise and sunset, exhibit two opaque black balls vertically, from the foremast-head ; each ball not less than three feet diameter.

Q.—Scudding, you are suddenly taken by the lee, or broach-to ?

A.—Get the head-yards braced round full, to keep headway on her, that she may answer her helm ; and when she comes to her course again, trim her to steer better, and let no one to the wheel that would be likely to get her into that position again.

Q.—How would you reef the topsails ?

A.—Slack away the halliards, haul in the weather brace until the sail shivers ; haul out reef tackles, snug up the bunt-lines, then lay aloft and reef the sail.

Q.—How would you send down a royal yard, in a gale, on the starboard tack ?

A.—To windward—Having a tripping line on the weather-foot rope, unbend the gear, stop the tie out to the lee-quarter, watch when she is steady, and sway taut the halliards or yard rope, and trip the yard, off with lifts and braces, and tend the yard down carefully on deck, and stow it on the booms, &c.

Q.—How would you act when taken aback on a wind ?

A.—Flatten in head-sheets and raise foretack and sheet, brace round the foreyard, and box her off ; but if too late, let the mainyard run square and let her come round, get her by the wind again, after yards not quite so sharp up, and watch her better afterwards.

Q.—If you have stern way, how would you put the helm to cant her head to port ?

A.—Port.

Q.—How do you know she is dragging in a fog ?

A.—By putting the hand-lead over.

Q.—How would you bend a topsail in a gale of wind ?

A.—Reef the sail at the foot, commencing at the close reef, taking in each of the three lower reefs separately, then bight it down, send it aloft with gantline and bunt-lines, bend the gear on in the top, get it snug to the yard, reef it to the yard, and bend afterwards.

Q.—Proceed to set the foretopmast studdingsail ?

A.—Steady the lower-yard (*well trimmed*), with lift and braces, send hands to get the boom out while others are getting the sail ready.

Q.—How would you ship a rudder?

A.—Rig a purchase over the rudder trunk, and sling the rudder with a ring or eye bolt in the centre of the head, and when up high enough, steady it into its place with guys at the heel, and put in the woodlock.

Q.—What do the bolsters rest on?

A.—The trestletrees; and the trestletrees rest on the checks of the mast.

Quarter boats should be looked after when in the davits, to cover them in a hot sun, and heave water often upon them; also the plug out in rainy weather.

Q.—Wear ship under all plain sail?

A.—Haul up the mainsail, brail in the spanker, up helm, keep the after canvas lifting. When you have the wind aft, square the head-yards, haul down the jib. As the wind comes upon the other quarter, brace up the after-yards, set the after canvas. As she comes, brace up head-yards, hoist jib, board main-tack and aft sheet; meet her with the helm.

Q.—How get the trestletrees off the masthead, no sheers near?

A.—I would get the lower yard on end if long enough; if not, lash a spar as a derrick up the side of the mast, wedging off to clear the trestletrees when lifting them with a tackle at head of spar, high enough above the lower masthead.

N. B.—The trestletrees can be put on by the same means.

### DETAILED EXPLANATION OF TACKING, WEARING, BOXING, &c.

TACKING.—Ease the helm down gradually; *Helm's a lee!* and let go the jib sheet and fore sheets. As soon as the wind is parallel with the yards, blowing directly upon the leaches of the square sails, so that all is shaking, *Raise tacks and sheets!* and let go the fore and main tacks and main sheets, keeping the fore and main bowline fast. As soon as the head is within a point or a point and a half of the wind, *Mainsail haul!* let go the lee main and weather cross-jack braces, and swing the afteryards round. While she is head to the wind, and the after sails are becalmed by the head sails, get the main tack down and sheet aft, and right your helm, using it afterwards as her coming to or falling off requires. As soon as she passes the direction of the wind, shift your jib sheets over the stays; and when the after sails take full, or when she brings the wind four points on the other bow, and you are paying off sufficiently, *Let go and haul!* brace round the head yards briskly, down fore tack and aft the sheet.

brace sharply up and haul your bowlines out, and trim down your head sheets.

It is best to haul the mainsail just before you get the wind right ahead, for then the wind, striking the weather leaches of the after sails, forces them round almost without the braces, and you will have time to brace up and get your tack down and sheet aft, when she has payed off on the other side.

If she falls off too rapidly while swinging your head yards, so as to bring the wind abeam or abaft, '*Vast bracing!*' Ease off head sheets and put your helm a-lee; and as she comes up, meet her and brace sharp up. If, on the other hand (as sometimes happens with vessels which carry a strong weather helm), she does not fall off after the after sails take, be careful not to haul your head yards until she is fully round; and if she should fly up into the wind, let go the main sheet, and, if necessary, brail up the spanker and shiver the cross-jack yards.

In staying, be careful to right your helm before she loses headway.

TO TACK WITHOUT FORE-REACHING, as in a narrow channel, when you are afraid to keep headway. If she comes slowly up to windward, haul down the jib and get your spanker-boom well over to windward. As you raise tacks and sheets, let go the lee fore-topsail brace, being careful to brace up again as soon as she takes aback. Also, hoist the jib, and trim down, if necessary, as soon as she takes on the other side.

TACKING AGAINST A HEAVY HEAD SEA.—You are under short sail, there is a heavy head sea, and you doubt whether she will stay against it. Haul down the fore topmast stay sail, ease down the helm, and raise fore sheet. When within about a point of the wind's eye, let go main tack and sheet, lee braces and after bowlines, and *Mainsail haul!* If she loses her headway at this time, shift your helm. As soon as she brings the wind on the other bow, she will fall off rapidly by reason of her sternway; therefore shift your helm again to meet her, and *Let go and haul!* at once. Brace about the head yards, but keep the weather braces in, to moderate her falling off. When she gets headway, right the helm, and as she comes up to the wind, brace up and haul aft.

TACKING BY HAULING OF ALL.—This can be done only in a smooth sea, with a light working breeze, a smart vessel and strong crew. Man all the braces. Let her come up head to the wind, and fall off on the other tack, shifting the helm if she gathers sternway. When you get the wind about five points on the other bow, *Haul off all!* let go all the braces and bowlines, and swing all the yards at once. Right the helm, board tacks, and haul aft sheets, brace up and haul aft.

TO TRIM THE YARDS WHEN CLOSE-HAULED.—In smooth water, with a light breeze, brace the lower yards sharp up, and trim the upper yards each a trifle in abaft the one below it. If you have a pretty stiff breeze, brace the topsail yard in about half a point more than the lower yard, and the topgallant yard half a point more than the topsail yard, and so on. If you have a strong breeze and a topping sea, and especially if reduced to short sail, brace in your lower yards a little, and the others proportionally. This will prevent the vessel going off bodily to leeward; and if she labours heavily, the play of the mast would otherwise carry away the braces and sheets, or spring the yards.

MISSING STAYS.—If, after getting head to wind, she comes to a stand and begins to fall off before you have hauled your main yard, flatten in your jib sheets, board fore tack, and haul aft fore sheet; also ease off spanker sheet, or brail up the spanker, if necessary. When she is full again, trim the jib and spanker sheets, and when she has recovered sufficient headway, try it again. If, after coming head to wind, and after the after yards are swung, she loses headway and refuses to go round, or begins to fall off on the same tack on which she was before, and you have shifted the helm without effect, haul up the mainsail and spanker, square the after yards, shift your helm again a-lee, so as to assist her in falling off, and brace round the head yards so as to box her off. As she fills on her former tack, brace up the after yards, brace round the head yards, sharp up all, board tacks, haul out and haul aft.

WEARING.—Haul up the mainsail and spanker, put the helm up, and, as she goes off, brace in the afteryards. If there is a light breeze, the rule is, to keep the mizzen topsail lifting, and the main topsail full. This will keep sufficient headway on her, and at the same time enable her to fall off. But if you have a good breeze and she goes off fast, keep both the main and mizzen topsails lifting. As she goes round, bringing the wind on her quarter and aft, follow the wind with your after yards, keeping the mizzen topsail lifting, and the main either lifting or full, as is best. After a vessel has fallen off much, the less headway she has the better, provided she has enough to give her steerage. When you have the wind aft, raise fore tack and sheet, square in the head yards, and haul down the jib. As she brings the wind on the other quarter, brace sharp up the after yards, haul out the spanker, and set the mainsail. As she comes to on the other tack, brace up the head yards, keeping the sails full, board fore tack and aft the sheet, hoist the jib, and meet her with the helm.

TO WEAR UNDER COURSES.—Square the cross-jack yards, ease off main bowline and tack, and haul up the weather clew of the main-

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sail. Ease off the main sheet, and haul up the lee clew, and the bunt-lines and leach-lines. Square the main yards and put the helm a-weather. As she falls off, let go the fore bowline, ease off the fore sheet, and brace in the fore yard. When she gets before the wind, board the fore and main tacks on the other side, and haul aft the main sheet, but keep the weather braces in. As she comes to on the other side, ease the helm, trim down the fore sheet, brace up and haul aft.

**TO WEAR UNDER A MAINSAIL.**—Vessels lying to under this sail, generally wear by hoisting the fore topmast staysail, or some other head sail. If this cannot be done, brace the cross jack yards to the wind, and, if necessary, send down the mizzen topmast and the cross-jack yard. Brace the head yards full. Take an opportunity when she has headway, and will fall off, to put the helm up. Ease off the mainsheet, and, as she falls off, brace in the mainyard a little. When the wind is abaft the beam, raise the main tack. When she is dead before it, get the other main tack down as far as possible; and when she has the wind on the other quarter, ease the helm, haul aft the sheet and brace up.

**TO WEAR UNDER BARE POLES.**—Some vessels, which are well down by the stern, will wear in this situation, by merely pointing the after yards to the wind, or sending down the mizzen topmast and the cross-jack yard, and filling the head yards; but vessels in good trim will not do this. To assist the vessel, veer a good scope of hawser out of the lee quarter, with a buoy, or something for a stop-water, attached to the end. As the ship sags off to leeward, the buoy will be to windward, and will tend to bring the stern round to the wind. When she is before it, haul the hawser aboard.

**BOX-HAULING.**—Put the helm down, light up the head sheets and slack the lee braces, to deaden her way. As she comes to the wind, raise tacks and sheets, and haul up the mainsail and spanker. As soon as she comes head to the wind and loses her headway, square the after yards, brace the head yards sharp aback, and flatten in the head sheets. The helm, being put down to bring her up, will now pay her off, as she has sternway on. As she goes off, keep the after sails lifting, and square in the head yards. As soon as the sails on the foremast give her headway, shift the helm. When she gets the wind on the other quarter, haul down the jib, haul out the spanker, set the mainsail, and brace the after yards sharp up. As she comes to on the other tack, brace up the head yards, meet her with the helm and set the jib.

**BOX-HAULING SHORT ROUND;** sometimes called *wearing short-round*.—Haul up the mainsail and spanker, put the helm hard a-weather, square the afteryards, brace the head yards sharp aback, and flatten

in the head sheets. As she gathers sternway, shift the helm. After this, proceed as in box-hauling by the former method. The first mode is preferable when you wish to stop headway as soon as possible; as a vessel under good way will range ahead some distance after the sails are all thrown flat aback.

Few merchant vessels are strongly enough manned to perform these evolutions; but they are often of service, as they turn a vessel round quicker on her heel, and will stop her from fore-reaching when near in shore, or when close aboard another vessel.

CLUB-HAULING.—This method of going about is resorted to when on a lee shore, and the vessel can neither be tacked nor box-hauled. Cock-bill your lee anchor, get a hawser on it for a spring, and lead it to the lee quarter; range your cable, and unshackle it abaft the windlass. *Helm's a-lee!* and *Raise tacks and sheets!* as for going in stays. The moment she loses headway, let go the anchor and *Main-sail haul!* As soon as the anchor brings her head to the wind, let the chain cable go, holding on to the spring; and when the after sails take full, cast off or cut the spring, and *Let go and haul!*

### STOWING CARGO.

Q.—Suppose you are appointed to a ship, what would you do first?

A.—Report myself, take a memorandum of the things in the ship under my charge; if about to take in cargo, I would see that the limbers were clear, the hold well swept, and the dunnage properly laid, and the pumps were all right.

Q.—Where are the limbers, and what are they?

A.—They are on each side of the keelson, and are square holes cut through the lower part of the ship's floor timbers. They form a channel which communicates with the pumps throughout the whole length of the floor.

Q.—How would you keep the limbers clear when the cargo was in?

A.—Before taking in cargo, I would pass a length of small chain through the limber holes and lead the ends up to some place easily got at, and by hauling backward and forward, the channel for the water may be kept clear.

Q.—In what part of the hold would you place most dunnage?

A.—In the wake of the chocks, plates and scuppers, around the masts, and pump wells, chain lockers, transoms, &c.

Q.—Name the general rule for dunnaging a ship?

A.—Place five inches more dunnage in the bilge than on the floors; or nine to ten inches on the floor, fifteen inches in the bilge, and three and a half inches in the wings.

Q.—What dunnage would you lay for a cargo in bags?

A.—On the floors, ten inches, fifteen in the bilge, and three or three and a half in the wings.

Q.—How would you lay the dunnage in the 'tween decks, and why?

A.—I would lay it athwart-ships, so that in case of leakage, the water might have free access to the scupper holes.

Q.—What dunnage would you allow for cases, bales and bags?

A.—One inch for cases, two-and-a-half inches for bales and bags.

Q.—How do you stow cases?

A.—With mark and number uppermost.

Q.—Where would you stow bale goods, and how?

A.—I would stow them in the after hold, mark and number uppermost, on their flats. Wing bales on their edges.

Q.—Why the wing bales on their edges?

A.—So that in case of leakage, only part of the bale would be damaged, and not the edges of each piece in the bale.

Q.—How would you stow an entire cargo of iron?

A.—I would rig a platform as high as the keelson or higher, then commence stowing from the fore part of the fore hatch, or from the heel of the fore mast, to the after part of the after hatch diagonally, and an inch or two apart, or grating fashion. Carry it over into the wings, right up both sides, bringing it up from the ends in a slant, like steps, towards the main hatch. Have bars along the sides to keep the chafe off the skin. To secure it, drive down pegs between the bars, and place planks over with good toms from the upper beams. The iron may be carried further forward and aft, if the trim of the ship will admit of it.

Q.—How do you raise the entire body of iron?

A.—*See above.* By stowing it grating fashion and bringing it up in a slant from the ends towards the main hatch.

Q.—What is the use of raising the body of iron?

A.—By doing so, the violent rolling of the ship is prevented, and she is more easy in a seaway.

Q.—You have a quantity of iron (200 tons) to take in; how would you stow it?

A.—Stow from the after part of the fore hatch to the fore part of the after hatch, each side of the keelson, till level with it, and then diagonally, *but not bring it up to a point.*

Q.—You have bale goods to go on top of it, what precaution would you take?

A.—Place an inch or an inch and a-half of planking on the iron to keep off the chafe.

Q.—What is "dead weight," and why have it in a ship?



A.—The heavy portion of the cargo—such as iron, copper, lead, and other metals, constitute “dead weight,” and is used to ballast the ship.

Q.—If the cargo to be stowed, consists of machinery and liquid in casks, where would you stow each?

A.—The machinery amidships, and the casks towards the ends of the vessel.

Q.—Where would you stow oil, resin, tar, &c.

A.—In the fore peak.

Q.—Where would you stow provisions?

A.—In the after hold.

Q.—How many kinds of acids are there?

A. Two; liquid and solid.

Q.—Where would you stow acids?

A.—On deck, or slung over the taffrail.

Q.—Why?

A.—So that if necessary, it might readily be thrown overboard.

Q.—The hold is nearly full with cargo at each end, and some hogsheads of beer are to be stowed; how would you lay the ground tier fore and aft along the bilge?

A.—Bilge and cuntline.

Q.—Where would you commence to stow casks?

A.—In the midships, and stow towards the wings.

Q.—When would you stow casks from wing to wing?

A.—When by so doing I can get another cask in the tier.

Q.—Supposing you had to stow a whole cargo of beer, in hogsheads, how would you form the lower tier?

A.—Bung up and bilge free and well quoined. Begin amidships and stow towards the ends till one longer is finished, then stow towards the wings. The bilges of the second, longer from the keelson in the cuntlines of the first longer.

Q.—How would you block off the ground tier in the wings?

A.—By dunnage wood, keeping the bilges free at the wings.

Q.—How would you stow the riding tier?

A.—In the cuntlines of the lower tier.

Q.—How would you secure the riding tier?

A.—By four quoins at the quarters of the casks.

Q.—How many heights of pipes, of puncheons, and of hogsheads, would you stow?

A.—Three heights of pipes, four of puncheons, and six of hogsheads.

Q.—How many gallons are there in a pipe, a puncheon, a hogshead, and a tun?

A.—In a pipe there are 126 gallons; in a puncheon, 84 gallons; in a hogshead, 63 gallons; in a tun, 252 gallons.

Q.—How many heights of beef tierces and flour barrels would you stow ?

A.—Six of tierces and eight of barrels.

Q.—How would you stow a single pipe of wine ?

A.—Fore and aft, with bung up, and bilge free, well quoined, with three inches of soft wood beds under the quarters.

Q.—Where are the quoins placed, and what are they for ?

A.—They are placed on the beds on each side of the cask, to prevent it rolling.

Q.—How do you keep the bilge free, and how do you know when it is so ?

A.—The bilge is kept free by the beds beneath the quarters. I know the bilge is free when I put my hand or a stick between it and the floor.

Q.—What are Lloyd's regulations regarding the depth to which a ship should be loaded ?

A.—A vessel bound over the sea ought not to be loaded deeper than when she presents three inches of side for every foot immersed.

Q.—Who is responsible for stowage ?

A.—The master.

Q.—How many tarpaulins are you compelled to cover the hatches with ?

A.—Not less than two.

NOTE.—In stowing a cargo of grain, dunnage from 10 to 16 inches, have good shifting boards, ventilators, and a passage for a man down to the pump-well. Four hundred tons is the greatest quantity you are allowed to stow in bulk, or two thirds in the case of larger vessels; sharp bottom vessels, one third less dunnage.

### THE LOG LINE AND GLASS.

The log consists of a piece of wood in the shape of a quadrant, with the arc loaded with lead to make it swim in an upright position, and of sufficient weight to cause it to be immersed without sinking. The *log line* usually consists of about *one hundred* fathoms, and after allowing *fifteen* or *twenty* fathoms for stray line, is divided into knots, and sometimes tens of knots.

Q.—What is the principle of the log line.

A.—The principle of the log line is, that the number of feet in a knot is the same part of a nautical mile as the number of seconds the sand is running is of an hour.

Q.—How many feet are there in a nautical mile ?

A.—6080; but 6000 is usually taken when finding the length of knot, so that the ship will always be behind the position by dead reckoning.

The length of knot to any glass may be found thus :—to the number of seconds the sand is running, affix a cypher, and divide by 6, the result is the number of feet in a knot, and any remainder doubled will give the odd inches.

Q.—What is the length of a knot to a twenty-eight second glass?

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$$\underline{46-4 \times 2 = 8}$$

A.—46 feet 8 inches.

Q.—Suppose all your log glasses are broken, what would you use instead?

A.—A watch, with a hand for seconds.

Q.—Supposing your line was measured for a twenty eight second glass, and you were running it with a fourteen; how would you find the correct distance?

A.—By doubling the quantity run off the reel.

### THE LEAD LINE.

Q.—How is the lead line marked?

A.—The lead line is marked thus:—

At 2 fathoms.....	Leather with two ends.
At 3 do. ....	do. three ends.
At 5 do. ....	White rag.
At 7 do. ....	Red rag.
At 10 do. ....	Leather, with a hole in it.
At 13 do. ....	Blue rag.
At 15 do. ....	White do.
At 17 do. ....	Red do.
At 20 do. ....	Cord, with two knots in it.

The deep sea lead is marked in the same manner up to 20 fathoms, after which there is a piece of cord with an additional knot for each 10 fathoms, and leather for every 5.

NOTE.—If the mark at 5 fathoms, and that at 15 fathoms, be *canvas*; that at 7 and 17 *bunting*; and that at 13 *cloth*, the distinction of one from the other during a dark cold night is evident from the feel by the hands or lips.

Q.—How would you proceed to get soundings with a deep-sea lead line?

A.—I would first get the lead line passed along the weather side outside the rigging, taking the lead forward and ready for use. Station the men along the side with coils in their hands, according to the depth of water expected. Then bring the ship to the wind, with main yard aback, putting the helm down at the same time. When the vessel's way has quite stopped, call out "*heave*," each man, as the line runs from his hand, calls out "*watch*," to an officer stationed aft to take correct soundings.

## SOUNDING.

To sound with the hand lead, a man stands in the weather main channels, with a breast-rope secured to the rigging, and throws the lead forward, while the vessel has headway on. If the depth corresponds with the marks upon the line, as if at 5, 7, or 10 fathoms, he calls out, "By the *mark five!*" &c. If it is a depth the fathoms of which have no mark upon the line, as 6, 8, or 9, he calls out, "By the *deep six!*" &c. If he judges the depth to be a quarter or a half more than a particular fathom, as, for instance, 5, he calls out, "And a quarter," or, "And a half, five!" &c. If it is 5 and three quarters, he would say, "Quarter less six!" and so on.

## CHARTER PARTY.

Q.—What is a charter party?

A.—A written contract by which a ship is let and hired for one or more voyages.

Q.—By whom may a charter party be contracted?

A.—The merchants and owner at home, and the master and agent generally when abroad.

Q.—Name the principal clauses in a charter party?

A.—The intended voyage, the freight, lay days and demurrage, and the penalty for non-performance.

Q.—What makes a charter party binding?

A.—The penalty for non-performance.

Q.—What makes it legal?

A.—Its being stamped, signed, sealed, and witnessed.

Q.—What are lay days?

A.—The number of days specified in the charter party for loading and discharging.

Q.—Suppose the charterer informed you that he could not find you a cargo, what would you do?

A.—Give him notice in writing when the ship was ready to take in.

Q.—What next?

A.—Lay out the lay-days and days of demurrage, claim the demurrage day by day, and finally protest against the charterer. Then send a copy of the protest to the owner that he may recover damages. I should then do the best I could to get another charter.

Q.—How do you claim demurrage?

A.—Day by day in writing on Saturday for Sunday.

Q.—You are about to charter your ship to a port not much frequented by shipping, what particulars would you be anxious to ascertain?

A.—If the port was safe, and the expenses of the port were moderate.

Q.—What are the expenses?

A.—Harbour and light dues, towage, cost for provisioning, watering, &c.

Q.—State at length the particulars you would ascertain before chartering?

A.—I would ascertain from some competent authority if there was sufficient water to admit the ship, that the nature of the port will allow the ship to be loaded and unloaded in all weathers, otherwise I would insert a special clause clearing the owner of all loss in case of delay. If the expenses were moderate, if the season of the year was favourable, what the customs of the port were, whether the goods would be shipped by weight or measurement, and what articles would be objectionable, also at whose expense the cargo would be loaded and discharged, that is in bringing it alongside and taking it to the consignees. I would have specified the quantity of dead weight and light freight to be taken. I would stipulate to have the ship loaded according to Lloyd's regulations, viz., three inches of side for every foot immersed. I should also be careful to ascertain the respectability of the charterer.

#### BILL OF LADING.

Q.—What is a bill of lading?

A.—A document whereby the master acknowledges the receipt of goods shipped on board.

Q.—When ought a bill of lading to be signed, and what ought the master to request to be produced before signing?

A.—Twenty-four hours after the goods are on board, the mate's receipt ought to be produced, and the master ought to look at it, and see that it is a clean receipt before signing the bill of lading.

Q.—What does a master obligate himself to perform in a bill of lading?

A.—To deliver the cargo received in the same good order and condition as it came on board to the proper consignee, on payment of the stipulated freight; the act of God, the dangers and accidents at sea, of fire, of the Queen's enemies, &c., being excepted.

Q.—Suppose the consignee refused to pay the freight, how would you act?

A.—I would apply for judicial authority to enable me to sell as much of the cargo as would pay the freight and all charges.

Q.—For your own security, how would you qualify your obligation in signing a bill of lading when the *quantity, quality, and condition* are unknown?

A.—By underwriting my signature with the words "*contents unknown,*" "*not liable for deterioration*" (i. e.), it getting worse.

### INVOICE AND MANIFEST.

Q.—What is an invoice, and what does it contain ?

A.—An invoice is an account of goods sold or consigned. It contains a description of the goods, with the quantity, quality, marks and numbers, with the prime cost, and all charges, such as freight, insurance, entry bond duty, dock charges, lighterage, commission, stamps, &c., also the name of the ship, of the master, export merchant, and of the consignee.

Q.—What is a manifest ?

A.—A document signed by the master, containing particulars relative to the cargo on board, such as the marks and numbers and quantity of the different articles as cargo, the names of the shippers and consignees, also the master's name, the tonnage of the ship, port of loading and discharging, lists of stores, crew, and passengers.

Q.—Where do you obtain the items for making up the manifest ?

A.—From the bills of lading.

Q.—What is done with the manifest ?

A.—It must be handed over to the Custom House on the arrival of the ship at the port of destination.

### PROTEST AND SURVEY.

Q.—If, on your arrival in port, you anticipate your ship or cargo damaged, on account of bad weather experienced during the passage, what would you do first ?

A.—Note a protest.

Q.—How ?

A.—By going to a notary and informing him that I anticipate damage to the cargo, and he makes a note of it.

Q.—If, after you have discharged part of your cargo, you find it damaged, what would you do then ?

A.—Call a survey, consisting of two ship-masters.

Q.—What would you require of them ?

A.—To certify that the cargo is properly stowed and dunnaged, and that it was damaged by sea water.

Q.—What would you do then ?

A.—Extend the protest.

Q.—How would you do that ?

A.—By taking my log book and certificate of survey to the notary, and leave them with him till the freight was paid, and all business was settled between the owner or charterer, and the shippers or their agents.

Q.—Your cargo is discharged and on the quay, what do you do then ?

A.—Call a survey of two respectable merchants not interested in the cargo.

Q.—What would you require of them ?

A.—To certify the amount of damage.

Q.—What must the surveyors be able to certify in order to enable the shipper to have a claim on the underwriters ?

A.—That the goods have been damaged by sea water.

Q.—What would you do with the certificate they gave you ?

A.—Send a duplicate to the owners.

Q.—When abroad who is the agent for the underwriters as well as for the owners ?

A.—The master.

### BOTTOMRY BOND.

Q.—What is a bottomry bond ?

A.—A contract whereby a ship is pledged on security of money advanced for the use of the ship.

Q.—Under what circumstances is a master authorised to borrow on bottomry ?

A.—When entering a port in distress, and he has no other way of raising money.

Q.—What is the authorised mode of getting money on bottomry ?

A.—By advertising, and taking the lowest amount of interest offered.

Q.—For what purpose must money so obtained be expended ?

A.—For the benefit of the ship.

Q.—After obtaining a bottomry bond, you find you have not sufficient money to complete repairs, what would you do ?

A.—Obtain a second bond.

Q.—And then suppose you had not sufficient ?

A.—Obtain a third if possible, or borrow on the cargo.

Q.—Under these circumstances, which is the first to be paid ?

A.—The last bond obtained, and backwards, according to date.

Q.—Is anything payable before a bottomry bond ?

A.—Yes ; seamen's wages.

Q.—When does the owner become liable for the amount borrowed on bottomry ?

A.—On the safe arrival of the ship at her destination.

Q.—If the ship is lost, is the owner liable then ?

A.—No ; the lender loses his money and interest.

### MORTGAGE.

Q.—What is Mortgage?

A.—When the ship is pledged by the owner himself, the transaction is termed a mortgage.

Q.—What is the difference between mortgage and bottomry?

A.—In the first the money obtained may be used by the owner any way he wishes, while in bottomry it must be expended entirely for the ship's use.

Q.—If the ship has been mortgaged and a bottomry bond has been raised, which is paid first?

A.—The bottomry bond.

### RESPONDENTIA.

Q.—What is respondentia?

A.—Money lent on security of cargo.

### OFFICIAL LOG.

Q.—What is an official Log Book?

A.—A book supplied by the Board of Trade, in which the master of a ship is compelled by law to make certain entries, to be returned to the shipping office at the termination of each voyage.

Q.—What are the entries to be made in the official log?

A.—A list of the crew, convictions, offences, punishment, conduct, character and qualification of each of the crew, illnesses and injuries, medical treatment, deaths, births and marriages, wages of seamen entering the navy, wages of deceased seamen, sale of deceased seamen's effects, collisions, and the circumstances attending the same.

Q.—Suppose an entry had to be made against a man, what would you be careful to do?

A.—To enter the offence at the proper time, have it witnessed, and read over to the man, within twenty four hours of the occurrence.

Q.—In the event of the man making a statement, would you enter it into the log?

A.—Yes, and have it properly signed.

Q.—What would you do with the effects of a deceased seaman?

A.—If possible, sell them; if I could not, I would deliver them up to the shipping master on my return.

Q.—What would you do with the balance of wages of a deceased seaman, and the proceeds of the sale (if any) of his property?

A.—Deliver them to the shipping master.



**Q.**—On your arrival home, what is to be done with the official log book ?

**A.**—It must be handed over to the shipping master within twenty-four hours after arrival.

**NOTE.**—The importance of keeping this book properly, and duly making all entries at the proper time, with the strictest regard to form, cannot be too strongly impressed on ship masters. By neglecting to do so, they subject themselves to heavy penalties, and their owners to loss and inconvenience. No fine or forfeiture can be deducted, and no punishment inflicted for any offence, unless the entries are properly made and attested.

## CHARTERING.

When about to charter a vessel, there are several points which it is necessary to ascertain: for instance—if the port or ports to which the ship is to be sent are safe; if the expenses are moderate; if the season of the year for going or returning be favorable; what are the customs of the port; whether the goods are to be shipped by measurement or weight; and what articles are objectionable. Specify the quantity of dead weight, and light freight, which the vessel is to receive on board; and stipulate to have the vessel loaded according to Lloyds' regulations—three inches of side for every foot immersed. If the vessel is to be loaded at a port where light freight may run more than 50 cubic feet to a ton, endeavor to obtain a compensating rate of freight on the particular goods.

Any intelligent shipmaster who has been to the port before, will be able from his experience to give the requisite information in these matters. Such is the uncertainty, however, attending all mundane operations, that even after the most careful inquiries have been made, and every precaution has been supposed to be taken, some hitch may be discovered that was never contemplated; and shipowners too frequently blame their captains for an accidental oversight such as they are themselves every day committing. How many hundreds of vessels, for example, are chartered in England for the East Indies, without the provision of saving clauses for objectionable goods? When the vessel arrives home, and her cargo is discharged, the owner, probably, has little reckoned that he has been giving 70 cubic feet to the ton; he feels surprised that his ship should not have carried more cargo, imagines there is some blame attaching to the captain, perhaps picks a quarrel with him about any trifle, and discharges him. More caution in the first instance, and a little reflection and consideration, would obviate any such disagreeable incidents.

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## SEXTANT.

The Sextant is a sector of a circle made of metal. The upper face is called the *plane of the instrument*, and the circular part the limb or *arc*. This arc has let into it a slip of white metal, usually silver or platina, which is divided into degrees and parts of degrees.

Full Sextants are divided to every 10 minutes, that is, every degree is sub-divided into six parts; half Sextants, to 15 minutes, that is, the degree is divided into four parts; and Quadrants to 20 minutes, or the degree is sub-divided into three parts.

The frame of the instrument carries on its face two glasses; one fixed, called the *horizon glass*, because it is through it we look at the horizon when taking an altitude; the other, called the *index glass*, is attached by means of a flat brass rod to the Vernier, and is made to revolve with it to the extent of the arc.

This Vernier, or as some prefer to call it, Nonius (both names being after different men who claim to have invented it), is a contrivance for subdividing small portions of arc into much more minute ones; thus, in a Sextant divided to 10' or 15', we can, by the Vernier, read to 10 seconds or 15 seconds, as the case may be.

The Vernier is divided from right to left, exactly as the arc is, and is fitted with two screws; one underneath to fasten it with, called the *clamp screw*; and the other at its end, forming a tangent to the arc, and hence called a *tangent screw*, is used for moving the Vernier after it is clamped.

On the right hand side of the Sextant face, and opposite to the horizon glass, is fitted a ring made double, the two parts being brought together by means of two screws in the front of the ring. This is for holding the Telescope. It can be raised or lowered by a screw underneath, so that the centre of the Telescope shall agree with the line between the silvered and unsilvered parts of the horizon-glass.

The Sextant, when in perfect order, should have its index and horizon glasses perpendicular to the plane of the instrument. These glasses also should be parallel to each other when the instrument is clamped at 0; and the inverting Telescope should have its axis parallel to the plane of the instrument.

NOTE.—In these three Adjustments, the sun, a star, or any distant object, will do as well as the horizon.

## ADJUSTMENT OF THE SEXTANT.

There are four adjustments to the Sextant'

The FIRST ADJUSTMENT is: To set the *index glass* perpendicular to the plane of the instrument. To do it, place the index to about the

middle of the arc, and holding the instrument horizontally, look obliquely into the index glass, and see if the true and reflected portions of the arc form one continuous arc; if they do, the index glass is perpendicular to the plane of the instrument; but if they do not, it must be made perpendicular by the screws at the back of the glass.

The SECOND ADJUSTMENT is: To set the *horizon glass* perpendicular to the plane of the instrument. To do it, set the index to 0, and holding the instrument horizontally, look through the horizon glass to the horizon, and see if the true and reflected portions of the horizon are in one straight line; if they are, then the horizon glass is perpendicular to the plane of the instrument; but if they are not in the same straight line, the horizon glass must be made perpendicular by a screw at the back of the glass.

The THIRD ADJUSTMENT is: To set the *horizon glass* parallel to the index glass when the index is at 0. To do it, set the index at 0, and holding the instrument vertically, look through the horizon glass to the horizon, and see if the true and reflected portions of the horizon are in one straight line; if they are, then the horizon glass is parallel to the index glass; but if they are not in the same straight line, the horizon glass is made parallel to the index glass by a screw at the back of the glass.

NOTE.—Many instruments are made without this screw; in such a case the INDEX ERROR must be found.

#### TO FIND THE INDEX ERROR BY THE HORIZON.

Hold the instrument vertically and look at the horizon; if the true and reflected portions of the horizon are not in the same straight line, move the tangent screw until they are. The reading on or off the arc is the index error. To be *added* if the reading is *off*, but *subtracted* if *on*.

#### TO FIND THE INDEX ERROR BY THE SUN.

Place the *index* to about thirty miles on the arc, and holding the instrument vertically look at the sun. On doing so, two suns will be seen. Bring them edge to edge, one above the other, by the tangent screw, read off, and mark it down. Put the index to about thirty miles off the arc, and bring the suns into contact again, and note the reading. Subtract the less from the greater, and divide the remainder by two, and the result is the index error. It must be *added* to altitudes &c., taken by the instrument when the *greater* reading is off the arc, but *subtracted* when the *greater* reading is on the arc. If both the readings are on or both off, half the sum instead of half the difference, is the error. To prove the accuracy of the observations, when one reading is on and the other off add them together, and divide the sum by 4 (four), the result should be the sun's semi-diameter, within a few seconds for the given day in the nautical al-

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manac; but should both readings be on or both off, one fourth their difference will be the semi-diameter. If it does not correspond, the observations must have been inaccurately made, and will have to be repeated.

EXAMPLE.

<p>(1st.) To find the Index Error.</p> <p>1st Reading 32' 10'' on. }                  2d do. 31' 10'' off. } subt.</p> <p>Divide by <math>\frac{2)1' 00''}{}</math></p> <p>Index error subt. 0' 30'' because                  greater reading is on the arc.</p>	<p>(2d.)</p> <p>1st Reading 5' 10'' on. }                  2d Reading 68' 30'' on. } add.</p> <p>Divide by <math>\frac{2)73' 40''}{}</math></p> <p>Index error subt. 36' 50'' because both                  readings are on.</p>		
<p>(3d.)</p> <p>1st Reading 32' 10'' off. }                  2d Reading 31' 10'' on. } subt.</p> <p>Divide by <math>\frac{2)1' 00''}{}</math></p> <p>Index error add. 0' 30'' because greater reading is off arc.</p>			
<p>(1st proof.) To prove the contacts. (2d proof.)</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>1st Reading 32' 10'' }                      2d do. 31' 10'' } sum.</p> <p>Divide by <math>\frac{4)63' 20''}{}</math></p> <p>Sun's semi-diam. 15' 50''</p> </td> <td style="width: 50%; vertical-align: top;"> <p>1st Reading 5' 10'' }                      2d do. 68' 30'' } difference.</p> <p>Divide by <math>\frac{4)63' 20''}{}</math></p> <p>Sun's semi-diam. 15' 50''</p> </td> </tr> </table>		<p>1st Reading 32' 10'' }                      2d do. 31' 10'' } sum.</p> <p>Divide by <math>\frac{4)63' 20''}{}</math></p> <p>Sun's semi-diam. 15' 50''</p>	<p>1st Reading 5' 10'' }                      2d do. 68' 30'' } difference.</p> <p>Divide by <math>\frac{4)63' 20''}{}</math></p> <p>Sun's semi-diam. 15' 50''</p>
<p>1st Reading 32' 10'' }                      2d do. 31' 10'' } sum.</p> <p>Divide by <math>\frac{4)63' 20''}{}</math></p> <p>Sun's semi-diam. 15' 50''</p>	<p>1st Reading 5' 10'' }                      2d do. 68' 30'' } difference.</p> <p>Divide by <math>\frac{4)63' 20''}{}</math></p> <p>Sun's semi-diam. 15' 50''</p>		
<p>(3d proof.)</p> <p>1st Reading 32' 10'' }                  2d do. 31' 10'' } sum.</p> <p>Divide by <math>\frac{4)63' 20''}{}</math></p> <p>Sun's semi-diameter, 15' 50''</p>			

The FOURTH ADJUSTMENT is: To set the axis of the telescope parallel to the plane of the instrument; to do it, screw in the inverting telescope, turn the sliding piece until two of the wires in it are parallel to the plane of the instrument. Then measure the angular distance between two stars, not less than 90 degrees apart, bring them into contact on one of the wires just mentioned, then by slightly raising or lowering the instrument, the star will appear on the other wire. If they are in contact on that wire as on the first, then the axis of the telescope is parallel to the plane of the instrument; if not, it is to be made adjust by the screws in the collar or socket holding the telescope.

MERCATOR'S CHART AND ITS USE.

*To find the latitude and longitude in.*

TO FIND THE LATITUDE AND LONGITUDE OF ANY PLACE.

To find the latitude—Insert one leg of the compasses in the spot where the ship is, and the other leg on the nearest parallel of latitude, which, carried to the margin of the chart and read from the least parallel, will give the latitude of the ship. To find the longitude—Insert one leg of the compasses in the spot where the ship is, and the

other leg on the nearest meridian, which, carried to the longitude side of the chart, and read from least meridian, will give the longitude in.

TO ESTABLISH THE SHIP'S POSITION IN A GIVEN LATITUDE  
AND LONGITUDE.

Place one leg of your compasses on the given degree of latitude, and the other on the miles, then take your parallel rulers, and place them on the given degree of latitude, and move them back until they are parallel with the miles, where they are to remain. Next take your compasses, and place one leg on the given degree of longitude and the other on the miles, then carry them on the same meridian up to the parallel rulers, and the spot where the leg of the compasses touch, is the ship's position.

TO FIND THE COURSE AND DISTANCE BETWEEN TWO PLACES.

To find the distance—Lay your parallel rulers so that the edge will just touch both places, then take your compasses, and measuring—say twenty or thirty miles on the latitude side of your chart—(and as nearly on a line with the two places as possible), then see, by repeating the number of times this distance will go between the two places, which summed, will give the distance required. To find the course—Slide the parallel rulers back to the nearest compass, will give the course magnetic. If the compass be magnetic, but true. If the compass be true, which may readily be made magnetic, or compass course to steer, by applying the variation the reverse way, viz:—easterly to port, and westerly to starboard.

TO FIND THE SHIP'S POSITION BY CROSS-BEARINGS.

Place your parallel rulers on the bearing by compass of the first object, slide them up to that object and draw out a line; next place the rulers on the bearing of second object, slide them up to this object, from which draw a line now where the two lines intersect, is the exact position of ship.

TO FIND THE SHIP'S POSITION BY TWO BEARINGS OF ONE OBJECT.

Lay your parallel rulers on the first bearing of the object, to which slide them up and draw out a line; next lay your parallels on the second bearing by compass, slide them up to the object, and draw out another line, then take the course the vessel has steered, and the distance sailed during the interval, upon both these lines, and where the legs of the compasses touch, is the distance from the object at both first and second bearings.

TO FIND THE COURSE YOU WOULD REQUIRE TO STEER IN A  
CURRENT.

First, establish the ship's position by cross-bearings or otherwise; from which place draw a small line in the direction the ship is going

with your parallels, lay off from where the ship is, the set of the current, for the one hour (in the direction it is setting), and make a mark; then take the rate the ship is sailing through the water, on your compasses, and insert one leg in the mark of where the current set, and the other, where it will touch on the line of the direction the ship is going. Your parallels placed on a line with these marks, and carried to the nearest compass, will give the course to steer.

#### TO FIND THE SHIP'S DISTANCE FROM A POINT OF LAND OR LIGHT, WITHOUT A TABLE, CHART, OR DIVIDERS.

This problem is of good service, sometimes when sailing up or down the coast, in clear weather, when you are unable to work your chart, from being muffled up, wet or cold.

Suppose POINT LEPREAU bears four points on your port bow, then let the ship keep on her course, until it bears the same number of points to the left of the first, bearing the distance, per log, the ship has run in the interval, will be your distance off the light at the last bearing. Any number of points will answer as well as four; but there must be the same number of points between the first and second bearing, as between the first bearing and ship's head.

#### EXAMPLE.

Ship sailing east, Point Lepreaux bears N. E., let your ship sail along until the light bears north; the distance, per log, the ship has sailed to alter the bearings four points, is the distance she is off the light.

#### EXPLANATION OF MARKS AND SIGNS ON CHART.

On Mercator's charts, parallels of latitude run east and west, while meridians of longitude run north and south (true). This may be employed in readily distinguishing the latitude from the longitude side of a chart, or portion of a chart, whose geographical position you are not acquainted with. The latitude side of Mercator's charts may also be known by an increase in the measurement of the miles as you rise the poles, while the longitudes remain equal. The figures placed on the chart, are soundings in fathoms, at low water, ordinary springs. Small anchors indicate anchorage; circles round the lights, is the range or distance the light can be seen; a waved line along coast, show in shore soundings, &c.; letters, such as M., St., &c., indicate the nature of the bottom—mud, sandstone, &c.; arrows show the rate and direction of the currents. On the majority of Mercator's charts now published, for all parts of the world, the variation is allowed, which at once gives the magnetic or compass course to steer. Should the true be required, the variation at the place must be allowed. If westerly, to the right; if easterly, to the left, of the compass course.

## LEADING LIGHTS OF ST. GEORGE'S CHANNEL.

## IRISH SIDE.

Name of Light.	Fixed, Flash, or Revolving.	Description.
Skelligs.....	1 Fixed, - -	Upper Light discontinued.
Calf Rock.....	1 Flash, 15 seconds	Shown over the Sea Horizon.
Fastnet Rock.....	1 Rev. 2 minutes.	All round the Horizon.
Old Head, Kinsale..	1 Fixed, - -	Red in wake of Horse Rock.
Roche Point.....	1 Rev. red, 1 min.	Bell in Fog, and 1 Fixed light (in wake of Daunt's Rock)
Ballycotton.....	1 Flash, 10 secs.	Bell in Fog.
Mine Head.....	1 Intermitting,	Seen 50 seconds and obscure
Hook Tower.....	1 Fixed, - -	10 seconds.
Saltees Light Ship..	2 Fixed, unequal heights, - -	2 Bells in Fog. Ball at fore and mainmast head, and gong in Fog.
Tuskar.....	1 Rev. 2 minutes,	Twice white and once red. Bell in Fog every half min.
Lucifer Shoal L.Ship	1 Fixed, red, -	Ball at mainmast head. Gong in Fog.
Blackwater L. Ship	1 Fixed, - -	2 Balls at main, and gong in Fog.
South Arklow L.Ship	1 Rev. 1 minute,	$\frac{1}{2}$ Ball over Ball, and gong in Fog.
North Arklow L.Ship	2 Fixed, - -	Unequal heights. Ball at fore and main.
Wicklow Head.....	1 Intermitting,	Seen 10 seconds and obscure 3 seconds.
Coding Bank L.Ship	1 Rev. red, 20 secs.	Ball and half Ball under, gong in Fog.
Kish Light Ship....	1 Rev. 1 minute,	Ball at main. Gong in Fog, and gun fired when Mail is expected.
Bailey (Howth)....	1 Fixed, - -	Horn in Fog.
Rockabill.....	1 Flash 12 seconds	Red and Bright.
Haulbowline Rock..	1 Fixed, - -	Light and Ball shown from half flood to half ebb. Fog Bell.
St. John's Point....	1 Intermitting,	Red. 1 min. dark 15 sec. bright 45 sec.
South Rock.....	1 Rev. 1 $\frac{1}{2}$ minutes	Bell in Fog.
Copeland.....	1 Fixed, - -	Bell in Fog.
Maidens.....	2 Fixed, unequal heights, - -	
Rathlin.....	1 Fixed, and one Intermitting, 50 and 10 seconds.	Gun every 20 minutes in Fog.

NOTE.—The Lightships on the Irish coasts, have three masts, and are painted black with white streak. The Lightships on the English side, except N. W. Lightship, are Red, and have balls the colour of the ship.

LEADING LIGHTS OF ST. GEORGE'S CHANNEL.

WELSH AND ENGLISH SIDE.

Name of Light.	Fixed, Flash, or Revolving.	Description.
Trevoze Head, . . . . .	2 Fixed . . . . .	Unequal heights.
Lundy Island, . . . . .	1 Rev. 2 mins. & Fixed under.	Gun every 15 minutes in fog.
Nash, . . . . .	2 Fixed . . . . .	
Mumbles, . . . . .	1 Fixed, . . . . .	Bell in Fog.
Caldy Island, . . . . .	1 Fixed, . . . . .	
St. Ann's, . . . . .	2 Fixed unequal heights. . . . .	In one clear the Crow and Toe Rocks, and Red in wake of Chapel Rocks.
Smalls, . . . . .	1 Fixed, . . . . .	Red in wake of Hats and Barrels.
South Bishop, . . . . .	1 Rev. 20 seconds	Gong in fog.
Cardigan Light Ship	1 Rev. red, 30 secs	Ball at main, and Gong in fog.
Bardsey, . . . . .	1 Fixed, . . . . .	
Caernarvon Bay, . . . . .	1 Rev., . . . . .	White and Red, flash every 20 seconds, twice white, once red; small ball over large one at masthead.
South Stack, . . . . .	1 Rev. 2 minutes,	Bell in Fog; Gun when Mail is expected and small revolving light every 1½ min.
Skerries, . . . . .	1 Fixed, . . . . .	Red in wake of Coal and Ethel Rocks.
Point Lynus, . . . . .	1 Flash 10 secs.,	Seen 8 seconds and obscure 2 seconds.
Ormes' Head, . . . . .	1 Fixed, . . . . .	Red from West to W. ¼ N.
Air, . . . . .	1 Fixed, . . . . .	Red from N W to E by S ½ S. Bell in fog.
Hoylake, . . . . .	2 Fixed unequal heights, . . . . .	Marks for the Rock Channel.
Leasowe, . . . . .	1 Fixed, . . . . .	
Bidston, . . . . .	1 Fixed, . . . . .	
Black Rock, . . . . .	1 Rev. 1 minute,	Twice white and once red. Tide-light when 11 feet. Ball by day, and Bell every half minute in fog.
N. W. Light Ship, . . . . .	1 Rev. 1 minute,	Bell and gong alternately in fog. Ball at foremast head. Black ship with white streak.
Formby Light Ship, . . . . .	1 Fixed, red, . . . . .	Ball by day, and Bell in fog.
Crosby Shore, . . . . .	1 Fixed, . . . . .	
Crosby Light Ship, . . . . .	3 Fixed, yellow, (Triangular,)	Ball by day.
Morecambe, L. Ship	1 Rev. red, 30 secs	Gong in fog. Ball by day, and Gun fired when vessels are approaching danger.
Walney Island, . . . . .	1 Rev. 1 minute, . . . . .	And red tide-light fixed.
St. Bees, . . . . .	1 Fixed, . . . . .	
Bahama Light Ship, . . . . .	2 Fixed, unequal heights, . . . . .	Ball at each mast. Gong in fog, and Gun fired when vessels are approaching danger.
Point of Ayre, . . . . .	1 Rev. 1 minute,	Red and white alternately.
Douglas Head, . . . . .	1 Fixed, . . . . .	Blue.
Calf of Man, . . . . .	2 Rev. 2 minutes,	Unequal heights. In one lead on Chicken Rocks.

NOTE.—The Lightships on the Irish Coast have three masts, and are painted black with white streak. The Lightships on the English side, except N. W. Lightship, are Red, and have Balls the colour of the ships.



## LEADING LIGHTS OF THE ENGLISH CHANNEL.

## ENGLISH SIDE.

Name of Light.	Fixed, Flash, or Revolving.	Description.
Bishop Rock, Scilly Island,....	1 Fixed,.....	Bell in fog.
St. Agness,.....	1 Rev. 1 minute,	
Sevenstones L. Ship,	2 Fixed, unequal heights.	Ball at fore and mainmast head. Gong in fog, and gun fired when vessels are approaching danger.
Longships,.....	1 Fixed, .....	Red in wake of the Rundlestone.
Wolf Rock,.....	1 Rev.....	Flash red and white every 30 seconds; shown all over the horizon. Fog bell.
Lizard,.....	2 Fixed, unequal heights,.....	In one clear the Manacles East, and Wolf Rocks Westward.
Eddystone,.....	1 Fixed,.....	Bell in fog proposed.
Start Point,.....	1 Fixed & Flashes,	Every minute; also a fixed light in direction of Berry head, to cover the Skerrie Rocks. Fog Bell.
Portland, Bill of,....	2 Fixed, unequal heights,.....	In one they lead between Raec and Shambles.
Outer Needle,....	1 Fixed,.....	Shows red from N. W. $\frac{1}{2}$ N. to E., and from E. S. E. to S. W. b W. Bell in fog.
St. Catherine,.....	1 Fixed,.....	Fog-horn; blast 5 sec; interval 15 sec.
Beechy Head,.....	1 Rev. 2 minutes,	15 secs. bright, and 1 min. 45 secs. dark.
Dungeness,.....	1 Fixed,.....	Electric light; 1 red light to mark the anchorage. Fog-horn blast 5 seconds interval 20 seconds.
Casquets,.....	3 Revs. 20 secs.,	Triangular bell in fog.
Cape La Hague,....	1 Fixed,.....	On the Rock Gros du raz, one-third of a mile from shore.
Ushant, N. E. point,	1 Fixed,.....	Twice white; once red.
Do. N. W.	1 Rev, 20 secs.,	
South Foreland,..	1 Fixed,.....	Electric Light.
North Do.	1 Fixed,.....	

Name of Light.	Description.	Remarks.
Cape Sable, . . . . .	1 Rev., . . . . .	Bright 15 secs., eclipsed 25 secs.; on the Cape.
Seal Island, . . . . .	1 Fixed, . . . . .	Shown over Sea Horizon. Steam Whistle, b. 5s.; interval 5s.; b. 5 s.; then interval 45 secs.
Cape Fourchu, . . . . .	1 Rev. 1m. 45s., . . .	Bright 1 m. 15 s.; eclip. 30 s.; S. Whistle, blast 10 secs.; interval 50 secs.
Cape St. Mary, . . . . .	1 Rev. 1 minute, . . .	Rev. 30 s.; Bright 30 s.; altern'tly.
Bryer Island, . . . . .	1 Fixed, . . . . .	N. W. Side of Island.
Grand Passage, Peters Island, . . . . .	2 Fixed, Horz., . . .	West Side of South Entrance.
Petit Passage, Boars-head, . . . . .	1 Rev. 1 minute, . . .	Red and White alternately.
Prim Point, Digby Gut, Port Wm. Marshall's Cove, . . . . .	1 Fixed, . . . . .	West Side of entrance, and Steam Whistle.
Margaretville, . . . . .	2 Fixed, Vertical, . .	Upper Light, white; Lower, green.
Black Rock Point, . . . .	2 Fixed, Vertical, . .	Upper Light, white; Lower, red.
Horton Bluff, . . . . .	1 Fixed, . . . . .	On the Point.
Burncoat Head, . . . . .	1 Fixed, . . . . .	West Side of Avon River.
Partridge Id., Parsboro, N.S., Basin Minas, Apple River, Hetty Pt. } Cape Enrage, . . . . .	1 Fixed, . . . . .	South Side of Cobequid Bay.
	1 Fixed, . . . . .	On the East end of Sandy Spit.
	1 Fixed, . . . . .	North Side of the Entrance.
	1 Fixed, . . . . .	On the Cape North Side Chignecto Channel.
Grindstone Island, . . . .	1 Fixed, . . . . .	On the West part of the Island.
Quaco Head, . . . . .	1 Rev. 20 seconds, . .	On a Ledge of rocks, foot of Tower.
Partridge Island, Saint John, N. B., . . . . .	1 Fixed, . . . . .	In the middle of the Entrance. S. Whistle; b. 10 s. every minute.
Point Lepreaux, . . . . .	2 Fixed, Vertical, . .	On the extremity of the Point. S. Whistle; b. 5 s.; interval 5 s.; b. 5 s.; interval 45 secs.
Bliss Island, . . . . .	1 Fixed, . . . . .	Red on the Island.
Wolfs, . . . . .	1 Rev., . . . . .	Bright, on South side, 1 minute.
Saint Andrews, . . . . .	1 Fixed, . . . . .	North side of entrance Channel.
Campobello Island, . . . .	1 Fixed, . . . . .	At the North end of Island.
Grand Manan, Swallow-tail, . . . . .	1 Fixed, . . . . .	At the N. E. end of Island.
Gannet Rock, . . . . .	1 Rev., . . . . .	Fixed 45 secs.; eclipsed 5½ secs.; Flash 4½ secs. Gun in Fog.
Machias Seal Island, . . .	2 Fixed, Horz., . . .	On the largest of the Islands. Steam Whistle.
West Quoddy Head, . . . .	1 Fixed, . . . . .	South side of entrance to Bay. S. Whistle; b. 8 s.; interval 52 s.
Little River, . . . . .	1 Fixed & Flashes 90 seconds, . . . .	On the Island. Fog Bell.
Moose Peak, . . . . .	1 Rev. every 30s., . . .	On Mistake Island.
Nash's Island, . . . . .	1 Fixed, Red, . . . . .	Off the Mouth of Pleasant River. Fog Bell.
Petit Manan, . . . . .	1 Fixed & Flashes 2 minutes, . . . . .	On the South end of Island. Steam Whistle.
Mount Desert Rock, . . . .	1 Fixed, . . . . .	Shown all round the Horizon. Fog Bell.
Baker's Island, . . . . .	1 Fixed & Flashes 90 seconds, . . . . .	South of the entrance to Frenchman's Bay.
Bass Harbour, . . . . .	1 Fixed, Red, . . . . .	On the Head.

## NOVA SCOTIA—EAST COAST.

Name of Light.	Description.	Remarks.
Scatteri, . . . . .	1 Rev. $\frac{1}{2}$ minute, . .	
Louisberg, . . . . .	1 Fixed, . . . . .	
Green Island, . . . . .	1 Fixed, Red, . . . . .	
Cape Canso, . . . . .	2 Fixed, . . . . .	In one Tower. Steam Whistle; blast 8 seconds every minute.
Hart Island, . . . . .	1 Fixed, Red, . . . . .	
White Head Island, . . . . .	1 Rev. 20 seconds, . . . . .	10 secs. Flash; 10 secs. Eclipse.
Beaver Island, . . . . .	1 Rev. 2 minutes, . . . . .	
Egg Island, . . . . .	1 Rev. 1 minute, . . . . .	Red and White alternately.
Devil Island, . . . . .	1 Fixed, . . . . .	Dull Red to seaward.
Chebucto Head, . . . . .	1 Rev. 1 minute, . . . . .	
Sambro, . . . . .	1 Fixed, . . . . .	Gun in Fog.
St. Margaret's Bay, . . . . .	1 Fixed, Red, . . . . .	On Peggy Point.
Cross Island, . . . . .	2 Lights, . . . . .	Upper—Rev. 45 secs. bright; 15 secs. dark. Lower—fixed.
West Iron Bound Island, . . . . .	1 Rev. 30 seconds, . . . . .	
Liverpool, . . . . .	1 Rev. 2 minutes, . . . . .	
Little Hope Island, . . . . .	1 Rev. Red, . . . . .	Every minute.
Ragged Island Harbour, . . . . .	1 Fixed, . . . . .	
Shelbourne Harbour, . . . . .	2 Fixed, . . . . .	In one Tower.
Barrington, . . . . .	1 Fixed, Red, . . . . .	
Cape Sable, . . . . .	1 Revolving, . . . . .	Bright 15 seconds; dark 25 secs.
Seal Island, . . . . .	1 Fixed, . . . . .	

## THE ST. LAWRENCE.

Name of Light.	Description.	Remarks.
Scatteri, . . . . .	1 Rev. $\frac{1}{2}$ minute, . .	
Belle Isle, . . . . .	1 Fixed, . . . . .	A Gun every hour during Fog or Snow.
Armour Point, . . . . .	1 Fixed, . . . . .	A Gun every hour during Fog or Snow.
Cape Norman, N. F. L., . . . . .	1 Rev., 2 minutes, . . . . .	
Point Rich, . . . . .	1 Flash, 15 secs., . . . . .	
Cape Ray, . . . . .	1 Rev. and Flash, . . . . .	Rev. 2 $\frac{1}{2}$ minutes; Flash every 10 seconds.
St. Paul Island, N.E. point . . . . .	1 Fixed, . . . . .	
St. Paul Island, S.W. point . . . . .	1 Rev., 1 minute, . . . . .	Bell during Fog, and Gun every 4 hours.
Bird Rocks, . . . . .	1 Fixed, . . . . .	
Amherst Island, . . . . .	1 Rev., . . . . .	Red 30 seconds; white 30 secs.
Pasbebiac, . . . . .	1 Fixed, . . . . .	
Cape Rozier, . . . . .	1 Fixed, . . . . .	
Anticosti Island, . . . . .		
East end, . . . . .	1 Fixed, . . . . .	Must always be kept open to the Southward of Conesrant Point.
S. W. Point, . . . . .	1 Rev., 1 minute, . . . . .	
West Point, . . . . .	1 Fixed, . . . . .	A Gun every hour during Fog or Snow
South Point, . . . . .	1 Flash, 20 secs., . . . . .	Fog Whistle; blast 10 seconds every minute.

THE ST. LAWRENCE—(CONTINUED.)

Name of Light.	Description.	Remarks.
Cape Magdalen,.....	1 Rev,.....	Red and white every 4 minutes Red 15 secs. ; white 20 secs.
Seven Islands,.....	1 Fixed,.....	
Egg Island,.....	1 Rev, 1½ minutes	
Cape Chatto,.....	1 Flash,.....	Interval of 30 seconds between each Flash.
Point de Monte,.....	1 Fixed,.....	A gun every half hour in fog or snow.
Manicouagan Shoal, Light vessel,.....	2 Fixed,.....	On different Masts; Steam Whistle in fog or snow.
Father Point,.....	1 Fixed,.....	
Bicquette Island,.....	1 Rev., 2 minutes.	A gun every half hour in fog or snow.
Red Island Reef, Light vessel	1 Fixed,.....	Moored in 10 fathoms. A Steam Whistle; blast 10 seconds in every minute.
Red Islet,.....	1 Fixed,.....	
Green Island.....	1 Fixed,.....	Gun every hour during fog or snow.
Brandy Pots,.....	1 Fixed,.....	
Pilgrims,.....	1 Fixed,.....	
Kamouraska,.....	1 Fixed,.....	
St. Roque Shoal, Light vessel,	2 Fixed, ..	On separate masts. Bell in fog or snow. If the light vessel should be out of position the light on the foremast only will be exhibited, and du- ring the day the ball on the foremast will be taken down.
Lower Traverse, Light vessel	2 Fixed, ....	Main light 4 feet higher than the other. When the Light ship is out of place, the ball at the mainmast head is taken down during the day, and she exhibits one light instead of two during the night. A bell tolls during fog or snow.
Upper Traverse, Light vessel	2 Fixed,.....	Main Light 8 feet higher than the other. If the vessel should be out of place, the light on the foremast only will be ex- hibited, and during the day the ball on the foremast head will be taken down. A bell toll during fog or snow.
Stone Pillar,.....	1 Rev, 1½ minutes	
Crane Island,.....	1 Fixed,.....	
Belle Chasse,.....	1 Fixed,.....	
Point St. Lawrence,.....	1 Fixed,.....	
Monte du Lac,.....	1 Fixed,.....	
St. Antoine,.....	1 Fixed,.....	
St. Croix,.....	1 Fixed,.....	
Port Neuf,.....	2 Fixed,.....	Three lights in one lead up Richelieu Channel to the light on Richelieu Island.

## MANAGEMENT OF SHIPS AT SINGLE ANCHOR.

No. 1 is at anchor, head to wind and tide ; in fine weather nothing is required but to give her a slight sheer to keep her steady. It is when she takes the place of No. 2 that the mischief begins. The prime object is to keep *the cable taut*, that she may not tumble over her anchor.

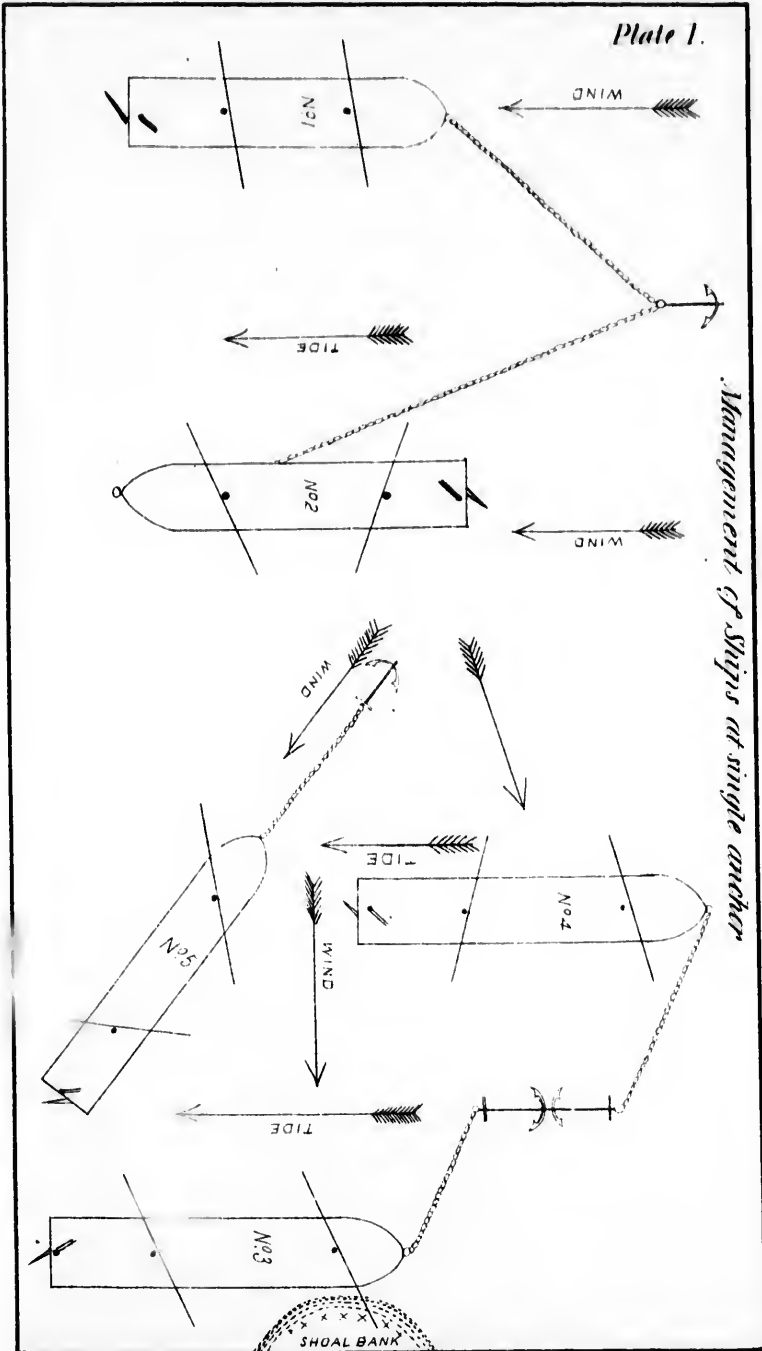
Orders should be given to call the officer when she "tends tide" or begins to cant, the yards being square will be laying aback, then hoist the staysail, hauling the weather staysail sheet aft. When she has brought the wind abaft the beam, and the yards are full, let draw the staysail sheet and *steer her taut a-head of her anchor* and cant the *afteryards* forward ; when the wind comes aft and the anchor astern, or a little on the starboard quarter, haul down the staysail, and brace the head yards bye, and drawing her to, put the helm *hard a starboard* ; she will then be No. 2, riding "weather tide," the wind a little on the port quarter, and the anchor on the starboard quarter.

No. 2 swings "lee tide" to resume the position of No. 1. When the tide begins to break she may get unsteady, the staysail should be hoisted, letting draw the sheet, and it may be necessary to steer her, but generally she will fall gradually round as the tide turns, and the staysail is hauled down. When she comes head to wind, give her a small sheer, and either square the yards or leave them, according to the weather, and not the look of the thing.

No. 3 has anchored with the wind blowing across the tide, and a shoal on her starboard side. The rule is, when the wind is *before the beam*, the ship lays to leeward of her anchor ; and when it is *abaft the beam*, she lays to windward of her anchor—see Nos. 3 and 4. But in the case of No. 3 the wind is abeam, and it is doubtful which way she ought to be laid ; however, as there is a danger near, she is according to another rule *sheered towards the danger*, that if she breaks her sheer she may go from it. In this case the helm is put up, the yards braced aback, and the staysail set with the weather sheet hauled aft—see No. 3. The wind veering a little, and coming abaft the beam No. 3, "*breaks her sheer*," and she may foul another ship, or run away with her anchor and go on the shoal, or part her cable. The same things may occur with No. 1, when she is assuming the position of No. 2, if she is not attended to. No. 2, having "broke her sheer," hoist the staysail, *fill all the yards*, and steer her ahead of her anchor ; and when you have got it astern, *brace forward the after yards*, haul down the staysail, brace the head yards, and, drawing her to, put the helm a-starboard—see No. 4.

No. 5 is supposed to be wind-ride, blowing heavy, her yards pointed to the wind, and the helm a little a-starboard. In this case

Plate 1.



Management of Ships at single anchor.

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it is blowing too much to allow her to come near her anchor on either tide, but she may tail round with the tide, and bringing the wind on her side, may require all the yards pointed to the wind to case her; she is then the reverse of No. 3.

#### DETAILED EXPLANATION OF GETTING UNDER WAY, &c.

UNMOOR.—Pay out on your riding cable, heaving in the slack of the other. When the other is short, trip it, cat and fish, and heave in on your riding cable. Instead of this method, the anchor which you are not riding by may be weighed, if it is a small one, by the long-boat. Send the long-boat out over the anchor, take aboard the buoy-rope, carrying it over the roller in the boat's stern, or through the end of a davit, clap the watch-tackle to it, and weigh it out of the ground. This done, and the buoy-rope and tackle secured to the boat, heave in on the chain on board, which will bring the anchor alongside, the boat approaching at the same time. When under the bow, cast off the fasts to the boat, heave up the anchor, cat and fish.

GETTING UNDER WAY FROM A SINGLE ANCHOR.—It is the duty of the chief mate to see all ready forward for getting under way; the rigging fair for making sail, the cat and fish tackles rove, and the fish-davit at hand. Heave short on your chain and pawl the windlass. Loose all the sails, if the wind is light, and sheet home and hoist up topsails, topgallant sails and royals. If there is a stiff breeze, set topsails alone, whole or reefed. You should always, if it will answer, cast on the opposite side from your anchor; that is, if you are riding by your starboard anchor, cast to port. Brace your head-yards aback and your after-yards full for the tack you mean to cast upon. The sails being set, man the windlass again, give her a sheer with the helm, and trip your anchor. The mate reports when it is away. As soon as it is away, hoist the jib. The fore-topsail aback will pay her head off. Put the helm for stern-board. When her head is off enough, fill away the head yards and haul out the spanker, shifting the helm for headway. Trim the yards for your course, and make sail on her. If the wind is light and the sea smooth, you may cat and fish your anchor after you get under way; but it is best in a rough sea to keep the vessel hove-to until the anchor is catted and fished.

TO CAT AND FISH AN ANCHOR.—When the anchor is lifted and brought under foot, pawl the windlass, keeping a good hold on the chain. Overhaul down the cat-block and hook it to the ring of the anchor. Stretch along the catfall and let all hands tally on. Set taut on the cat-tackle and pay out a little chain. Hoist away the anchor to the cat-head, and belay the fall. Pass the cat-stopper



through the ring of the anchor, through the chock, belay it to the cat-tail, and seize it to its own part. Overhaul down the fish-tackle, hook the lower block to the pennant, and hook the fish-hook to the inner fluke of the anchor. Rig out your fish-davit across the fore-castle, and put the bight of the pennant into the sheave-hole. Get a guy over it, near the outer end, to keep it down, and another at the inner end to keep it out. Get the shoe over the side, to fend off the bill of the anchor. Hoist the fluke well up, pass the shank painter under the inner arm and shank, bring it inboard, and belay and stop it to the timber-heads. Rig in the davit, unreeve the cat-fall and fish-tackle.

A vessel may sometimes be got under way to advantage with the jib and spanker; particularly if the wind is blowing directly out of the harbour. Heave the anchor up at once. When it has broken ground, hoist the jib, and, as she pays off, haul out the spanker. Keep her under this sail until the anchor is catted and fished, then make sail and stand out.

**TO GET UNDER WAY, WITH A WIND BLOWING DIRECTLY OUT, AND RIDING HEAD TO IT.**—Suppose the ship to have her starboard anchor down. Heave short and clear away the jib, and put the helm to port. Heave again until the anchor is up to the bows. Cat and fish. When the anchor is a-weigh, hoist the jib. Let her pay off under the jib. When she gathers head-way, shift the helm, and let fall the sails. When she gets before, sheet home and hoist the topsails, set the foresail, and haul down the jib. Make sail aloft.

**TO GET UNDER WAY, RIDING HEAD TO THE WIND, WITH A ROCK OR SHOAL CLOSE ASTERN.**—Suppose you wish to cast the ship on the starboard tack. Heave in a safe scope on the chain, and run out a kedje with a hawser from the starboard bow. Cast off the yard-arm gaskets and masthead the topsails, keeping the bunts fast. Heave taut on the hawser, and brace the yards up for the starboard tack, fore and aft, hauling the jib sheet to windward. Heave up the anchor, taking in the slack of the hawser, cat it, pass the stopper and have all ready for letting go. Haul ahead on the hawser, and as soon as the kedje is short apeak, or comes home, sheet home the topsails, run up the jib, and put the helm a-starboard. As soon as the jib fills, run the kedje up and take it in. When the topsails take and she gathers headway, draw the jib, set the spanker, board fore and main tacks, haul aft sheets and right the helm. If she falls off too rapidly when the topsails take, give her the spanker and mainsail, easing off the jib sheet. When she comes to, haul aft the jib sheet and board the fore tack. If, when the kedje is a-weigh, she fall off on the wrong side, let go the anchor.

**TO GET UNDER WAY, RIDING HEAD TO WIND AND TIDE, AND TO**

STAND OUT CLOSE-HAULED.—Suppose you wish to cast to port. Heave short, keeping the helm a-starboard. Set the topsails. Brace up the afteryards for the starboard tack, and back the head yards. Man the windlass and heave up the anchor. When the anchor is a-weigh, hoist the jib. When she has paid off sufficiently, fill away the headyards, shift the helm for headway, set the spanker, and make sail. Cat and fish, either before or after filling away.

If you have no room to cast on either side, but have a vessel on each quarter, heave short, set the topsails, jib, and spanker, brace all the yards half up for the starboard tack, weigh the anchor and put the helm to port. The tide acting on the rudder will sheer her head to starboard. When the sails take aback and give her sternway, the rudder and aftersails will act against the head sails, and she will drift fairly down between the two vessels. Keep her off or to, by the spanker and jib. When you are clear, cast to port, or, haul up the spanker, shiver the after yards, and let her go off before it.

TO GET UNDER WAY WIND-RODE, WITH A WEATHER TIDE; that is, a tide setting to windward.—Suppose you wish to cast to port. Heave short, loose the sails, and set the topsails. Square the after yards, and haul in the starboard head braces. Heave again, and when you are a-weigh, put the helm to port and hoist the jib. When she has paid off enough, fill away the head yards, and shift the helm for headway.

TO GET UNDER WAY, TIDE-RODE, CASTING TO WINDWARD.—Suppose the wind to be a little on the starboard bow, and you wish to cast to starboard, standing out on the port tack. Having hove short and set the topsails, brace up the afteryards for the port tack, and brace the headyards aback. Weigh the anchor, keeping your helm to port, and hauling the spanker boom well over to starboard. When she comes head to the wind, hoist the jib with the sheet to port. Shift the helm for sternway. As she falls off, draw the jib, fill the head yards, and shift the helm for headway.

TO GET UNDER WAY, TIDE-RODE, WEARING ROUND.—Suppose you have the wind on your starboard quarter, and are obliged to wear her round and stand out on the port tack. Set the topsails, square the head yards, and shiver the after yards. When the anchor is a-weigh, put the helm hard a-starboard, and give her the foresail if necessary. Having headway, she will go round on her heel, and you may proceed as in wearing.

If a vessel is in a confined situation, without room to cast by her sails or by the tide, she may be cast, by a spring upon her cable, leading in at that which will be the weather quarter. The spring may be bent to the ring of the anchor before it is let go, or it may be seized to the cable just outside the hawse-hole.

It will be remembered that when a vessel is riding head to the tide, the helm is put as though she had headway; and when the tide sets from astern, as though she had sternway. But you should be reminded, that when you have the wind and tide both ahead, if the vessel, after you weigh your anchor, goes astern faster than the current, the helm must be used as for sternboard.

**KEEPING WATCH.**—The officer, when relieved, should point out to his successor the bearings of lights or any objects in view, give him the soundings alongside, the time at which the ship is expected to swing if in a tide-way, how the cable grows, as well as any order or direction that may be passed as to tending the ship. The deep-sea lead should be kept over the side, and the soundings tried frequently, and the bearings of the lights or other objects taken repeatedly. He should enter in the night order-book, as well as on the log-slate, the bearing of the different lights and soundings when he leaves the deck, signing his name to the same at the time, and he who relieves him should see that these entries agree with his own observation. He should look at the cable occasionally, and see how it grows, and also see that the spare anchor is ready for letting go, and chain clear for running.

## REGULATIONS FOR PREVENTING COLLISIONS, AT SEA, &c.

### *Preliminary.*

Art. 1.—In the following Rules, every Steam Ship which is under sail and not under steam, is to be considered a Sailing Ship; and every Steam Ship which is under steam, whether under Sail or not, is to be considered a Ship under Steam.

### *Rules concerning Lights.*

Art. 2.—The Lights mentioned in the following Articles, numbered 3, 4, 5, 6, 7, 8, and 9, and no others shall be carried in all Weathers, from Sunset to Sunrise.

Art. 3.—Seagoing Steam Ships when under weigh shall carry :

(a) *At the Foremast Head*, a bright White Light, so fixed as to show an uniform and unbroken Light over an Arc of the Horizon of 20 Points of the Compass; so fixed as to throw the Light 10 Points on each side of the Ship, viz., from right ahead to 2 Points abaft the Beam on either Side; and of such a Character as to be visible on a dark Night, with a clear Atmosphere, at a distance of at least Five Miles :

(b) *On the Starboard Side*, a Green Light so constructed as to show an uniform and unbroken Light over an Arc of the Horizon of 10

Points of the Compass; so fixed as to throw the Light from right ahead to 2 Points abaft the Beam on the Starboard Side; and of such a Character as to be visible on a dark night, with a clear Atmosphere, at a Distance of at least Two Miles:

(c) *On the Port Side*, a Red Light, so constructed as to show an uniform and unbroken Light over an Arc of the Horizon of 10 Points of the Compass; so fixed as to throw light from right ahead to 2 Points abaft the Beam on the Port Side; and of such a Character as to be visible on a dark Night, with a clear Atmosphere, at a Distance of at least Two Miles:

(d) The said Green and Red Side Lights shall be fitted with in-board Screens, projecting at least Three Feet forward from the Light, so as to prevent these Lights from being seen across the bow.

Art. 4.—Steam Ships when towing other Ships, shall carry Two bright White Mast-head Lights vertically, in addition to their Side Lights, so as to distinguish them from other Steam Ships. Each of these Mast-head Lights shall be of the same Construction and Character as the Mast head Lights which other Steam Ships are required to carry.

Art. 5.—Sailing Ships under weigh, or being towed, shall carry the same Lights as Steam Ships under weigh, with the exception of the White Mast-head Lights, which they shall never carry.

Art. 6.—Whenever, as in the case of small Vessels during bad weather, the Green and Red Lights cannot be fixed, these Lights shall be kept on deck, on their respective sides of the Vessel, ready for instant exhibition; and shall on the approach of or to other Vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the Green Light shall not be seen on the Port Side, nor the Red Light on the Starboard Side.

To make the use of these portable Lights more certain and easy, the Lanterns containing them shall each be painted outside with the Colour of the Light they respectively contain, and shall be provided with suitable Screens.

Art. 7.—Ships, whether Steam Ships or Sailing Ships, when at anchor in Roadsteads or Fairways, shall exhibit where it can best be seen, but at a height not exceeding twenty feet above the Hull, a White Light, in a globular Lantern of eight inches in Diameter, and so constructed as to show a clear, uniform and unbroken Light visible all round the Horizon, and at a distance of at least One Mile.

Art. 8.—Sailing Pilot Vessels shall not carry the Lights required for other Sailing Vessels, but shall carry a White Light at the Mast-head, visible all round the Horizon—and shall also exhibit a Flare-up Light every fifteen minutes.

Art. 9.—Open Fishing Boats and other open Boats shall not be required to carry the Side Lights required for other Vessels; but shall, if they do not carry such Lights, carry a Lantern having a Green Slide on the one side, and a Red Slide on the other side; and on the approach of or to other Vessels, such Lanterns shall be exhibited in sufficient time to prevent Collisions, so that the Green Light shall not be seen on the Port Side, nor the Red Light on the Starboard Side.

Fishing Vessels and open Boats when at anchor, or attached to their nets and stationary, shall exhibit a bright White Light.

Fishing Vessels and open Boats, shall however, not be prevented from using a Flare-up in addition, if considered expedient.

#### *Rules concerning Fog Signals.*

Art. 10.—Whenever there is Fog, whether by day or night, the Fog Signals described below, shall be carried and used, and shall be sounded at least every Five Minutes, viz. :—

(a) Steamships under weigh shall use a Steam Whistle placed before the funnel, not less than eight feet from the deck :

(b) Sailing Ships under weigh shall use a Fog Horn :

(c) Steamships and Sailing Ships when not under weigh shall use a Bell.

#### *Steering and Sailing Rules.*

Art. 11.—If two Sailing Ships are meeting End on or nearly End on so as to involve Risk of Collisions, the Helms of both shall be put to Port, so that each may pass on the Port Side of the other.

Art. 12.—When two Sailing Ship are crossing so as to involve Risk of Collision, then, if they have the Wind on different Sides, the Ship with the Wind on the Port Side shall keep out of the Way of the Ship with the Wind on the Starboard Side; except in the case in which the Ship with the Wind on the Port Side is closed hauled and the other Ship free, in which case the latter Ship shall keep out of the Way; but if they have the Wind on the same Side, or if one of them has the Wind aft, the Ship which is to windward shall keep out of the Way of the Ship which is to leeward.

Art. 13.—If two Ships under Steam are meeting End on or nearly End on, so as to involve Risk of Collisions, the Helms of both shall be put to Port, so that each may pass on the Port Side of the other.

Art. 14.—If two Ships under Steam are crossing so as to involve Risk of Collision, the Ship which has the other on her own Starboard Side, shall keep out of the way of the other.

Art. 15.—If two ships, one of which is a Sailing Ship, and the other a Steam Ship, are proceeding in such directions as to involve

Risk of Collision, the Steam Ship shall keep out of the way of the Sailing Ship.

Art. 16.—Every Steam Ship when approaching another Ship so as to involve Risk of Collision, shall slacken her speed, or, if necessary, stop and reverse; and every Steam Ship shall, when in a Fog, go at a moderate speed.

Art. 17.—Every Vessel overtaking any other Vessel shall keep out of the way of the said last-mentioned Vessel.

Art. 18.—Where by the above Rules one of two Ships is to keep out of the way, the other shall keep her Course, subject to the Qualifications contained in the following Article.

Art. 19.—In obeying and construing these Rules, due regard must be had to all dangers of Navigation; and due regard must also be had to any special circumstances which may exist in any particular case, rendering a departure from the above Rules necessary in order to avoid immediate danger.

Art. 20.—Nothing in these Rules shall exonerate any Ship, or the Owner, or Master, or Crew thereof, from the consequences of any neglect to carry Lights or Signals, or of any neglect to keep a proper look-out, or of the neglect of any precaution which may be required by the ordinary practice of Seamen, or by the special circumstances of the case.

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Whereas there has been doubt or misapprehension concerning the effect of the said two articles:

And whereas the Admiralty and the Board of Trade, have jointly recommended to Her Majesty, to make the following additions to the said regulations for the purpose of explaining the said recited articles, and of removing the said doubts and misapprehensions:

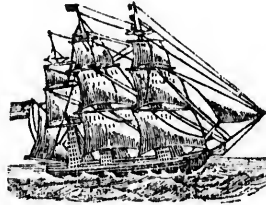
Now, therefore, Her Majesty, by virtue of the power vested in Her, by the said recited Act, and by and with the advice of Her Privy Council, is pleased to make the following additions to the said regulations by way of explanation of the said two recited articles; that is to say—

The said two articles numbered 11 and 13 respectively, only apply to cases where ships are meeting end on or nearly end on *in such a manner as to involve risk of collision*. They consequently do not apply to two ships which must, if both keep on their respective course, pass clear of each other.

The only cases in which the said two articles apply, are when each of the two ships is end on or nearly end on to the other; in other words, to cases in which *by day*, each ship sees the masts of the other

in a line or nearly in a line with her own ; and *by night*, to cases in which each ship is in such a position as to see both the side lights of the other.

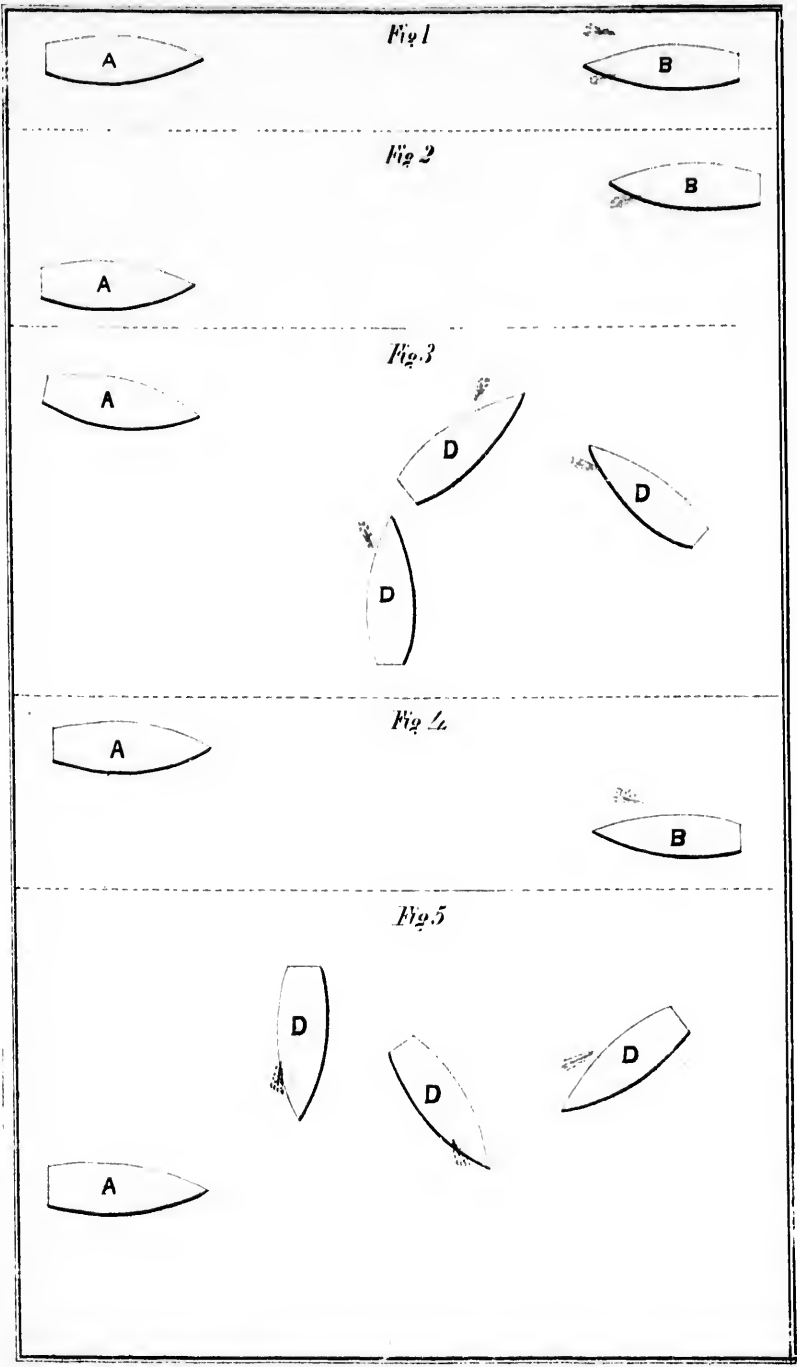
The said two articles do not apply *by day* to cases in which a ship sees another *ahead* crossing her own course ; or *by night* to cases where the red light of one ship is opposed to the red light of the other ; or where the green light of one ship is opposed to the green light of the other ; or when a red light without a green light, or a green light without a red light, is seen ahead ; or where both green and red lights are seen anywhere but ahead.



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LATE, 2.

DIAGRAMS TO ILLUSTRATE THE USE OF THE LIGHTS CARRIED BY VESSELS AT SEA,

*And the manner in which they indicate to the vessels which see them, the position and description of the vessel that carries them.*

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WHEN BOTH GREEN AND RED LIGHTS ARE SEEN.

**A** sees a Red and Green Light ahead:—**A** knows that a vessel is approaching her on a course directly opposite to her own, as **B**, (Fig. 1.)

If **A** sees a White Mast-head Light above the other two, she knows that **B** is a steam vessel.

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WHEN THE RED AND NOT THE GREEN LIGHT IS SEEN.

**A** sees a Red Light ahead or on the bow;—**A** knows that either (Fig. 2), a vessel is approaching her on her Port bow, as **B**; or (Fig. 3), a vessel is crossing in some direction to Port, as **DDD**.

If **A** sees a White Mast-head Light above the Red Light, **A** knows that the vessel is a steam vessel, and is either approaching her in the same direction as **B**, or is crossing to Port in some direction as **DDD**.

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WHEN THE GREEN AND NOT THE RED LIGHT IS SEEN.

**A** sees a Green Light ahead or on the bow:—**A** knows that either (Fig. 4), a vessel is approaching her on her Starboard bow, as **B**, or (Fig. 5), a vessel is crossing in some direction to Starboard, as **DDD**.

If **A** sees a White Mast-head Light above the Green Light, **A** knows that the vessel is a steam vessel, and is either approaching her in the same direction, as **B**, or is crossing to starboard in some direction as **DDD**.

## THE RULE OF THE ROAD AT SEA.

## AIDS TO MEMORY.

BY THOMAS GRAY,

*Secretary of the Board of Trade, London.**1st. Two Steam Ships meeting.*

When both side lights you see ahead,  
Port your helm and show your Red.

*2nd. Two Steam Ships passing.*

Green to Green, or Red to Red,  
Perfect safety—go ahead!

*3rd. Two Steam Ships crossing.*

NOTE.—This is the position of greatest danger; there is nothing for it but a good look-out, caution, and judgment.

If to your Starboard Red appear,  
It is your duty to keep clear;  
To act as judgment says, is proper,  
To Port, or Starboard, Back, or Stop her!  
But when upon your Port is seen—  
A Steamer's Starboard light of Green;  
There's not so much for you to do,  
For Green to Port, keeps clear of you.

*4th. All ships must keep a good look-out, and Steam Ships must stop and go astern, if necessary.*

Both in safety and in doubt,  
Always keep a good look-out;  
In danger, with no room to turn—  
Ease her! stop her! go astern!

HEADS OF EXAMINATION

*In Regulations respecting Lights and Fog Signals, and in the Steering and Sailing Rules.*

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1.—What light or lights are required by the regulations to be exhibited by sailing vessels at anchor in a roadstead or fairway?

A.—One light only, viz., a white light.

2.—What light or lights are required by the regulations to be exhibited by steam ships in a roadstead or fairway at anchor.

A.—The same as for sailing vessels.

3.—Where is the anchor light to be exhibited?

A.—Where it can best be seen. It must of course be placed where there is the least possible chance of obstruction from spars, ropes, &c. &c.

4.—To what height may the anchor light be hoisted?

A.—It may be exhibited at a height of 20 feet above the deck, but not higher.

5.—What is the description of the lantern containing the anchor light required by the regulations?

A.—Globular.

6.—In what direction or directions must the anchor light show?

A.—It must show a clear, uniform, and unbroken light, visible all round the horizon.

7.—At what distance must it be visible?

A.—At least one mile.

8.—What is the number of lights required by the regulations to be carried by sailing ships when under weigh at night.

A.—Two.

9.—Of what colour are these lights, and how are they to be placed on board the ship?

A.—A green light on the starboard side, and a red light on the port side.

10.—What description of light must be shown from the sides of sailing vessels under weigh; and over how many points of the compass, and in what directions, and how far, are they required to show?

A.—Each light must be so constructed as to show an uniform and unbroken light over an arc of the horizon of 10 points of the compass; so fixed as to throw the light from right ahead to two points abaft the beam on the starboard and port sides respectively; and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles.

11.—What light are they to carry when being towed at night?

A.—The same.

12.—Are the side lights required to be fitted with screens; and if so, on what side, and of what length, and how?

A.—Yes, on the inboard side: at least three feet in length, measuring forward from the light. They are to be so fitted as to prevent the colored lights from being seen across the bows.

13.—What is the number of lights required by the regulations to be carried by steam ships when under steam at night?

A.—Three lights.

14.—Of what colour are these lights, and how are they to be placed on board the ship?

A.—White at the fore mast head, green on the starboard side, and red on the port side.

15.—Over how many points of the compass, in what direction, and how far, is the fore-mast head light of a steamer required to show?

A.—Over 20 points, viz., from right ahead to two points abaft the beam on both sides. It must be of such a character as to be visible on a dark night, with a clear atmosphere at a distance of at least five miles.

16.—Are they required to be fitted with screens; and if so, on which side, and of what length?

A.—The green and red lights are to be fitted with screens on the inboard side, extending at least three feet forward from the light, as in the case of sailing vessels.

17.—Over how many points of the compass, in what direction, and how far, are the colored side lights of steamers required to show?

A.—Each light must be so constructed as to show an uniform and unbroken light over an arc of the horizon of 10 points of the compass so fixed as to throw the light from right ahead to two points abaft the beam on the starboard and port sides respectively, and of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least two miles.

18.—What description of lights are steamers required by the regulations to carry when they are not under steam, but under sail only?

A.—Side lights only, the same as sailing vessels.

19.—What exceptional lights are to be carried by small sailing vessels in certain cases?

A.—Whenever, as in the case of small vessels during bad weather, the green and red lights cannot be fixed, these lights shall be kept on deck, on their respective sides of the vessel, ready for instant exhibition, and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side, nor the red light on the starboard side.

To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the colour of the light they respectively contain, and shall be provided with suitable screens.

21.—What description of light are sailing pilot vessels required to carry ?

A.—Sailing pilot vessels are not to carry coloured side lights, but a white light like an anchor light, and to burn a flare up every 15 minutes.

22.—What lights are open boats and fishing boats required to carry ?

A.—Open fishing boats and other open boats shall not be required to carry the side lights required for other vessels; but shall, if they do not carry such lights, carry a lantern having a green slide on the one side, and a red slide on the other side; and on the approach of or to other vessels, such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side, nor the red light on the starboard side.

Fishing vessels and open boats when at anchor, or attached to their nets and stationary, shall exhibit a bright white light.

23.—May open boats use a flare up ?

A.—Yes, if considered expedient.

24.—Is the flare up to be shown by open boats instead of or in addition to the lantern with the colored slides ?

A.—The flare up must be in addition to the lantern with the two colored slides.

25.—What lights are steamships required to carry when towing other ships ?

A.—Steam ships, when towing other ships, shall carry two bright white mast-head lights vertically, in addition to their side lights, so as to distinguish them from other steam ships. Each of these mast-head lights shall be of the same construction and character as the mast-head lights which other steam ships are required to carry.

26.—Are sailing vessels required to use any signals when at anchor, or when sailing in thick weather, or in a fog; and if so, what are they ?

A.—Yes: a fog horn and a bell.

27.—When is each sort of signal to be used ?

A.—The fog horn is to be sounded when under weigh in a fog, and the bell when in a fog, and not under weigh.

28.—How often are the fog signals of sailing vessels to be sounded ?

A.—As often as necessary, but every five minutes at least.

29.—Are steam ships required to use any signals in a fog or in thick weather; and if so, what are they ?

A.—Yes; a steam whistle and a bell.

30.—When is each signal to be used ?

A.—The steam whistle to be sounded when under weigh, and the bell when not under weigh.

31.—How often are the fog signals of steamers to be sounded?

A.—As often as necessary; but every five minutes at least.

32.—At what height above the deck is the steam whistle to be placed; and where?

A.—Not less than eight feet above the deck. Before the funnel.

33.—What other precaution is to be observed by steamers when steaming in a fog?

A.—The regulations require the steam ships in a fog shall go at a moderate speed.

34.—What precaution is to be taken by steamers approaching another vessel?

A.—If there is risk of collision, the steamer is to slacken speed, or if necessary stop and reverse.

35.—If you see a white light alone, what does it denote as regards the ship carrying it?

A.—It denotes the presence of a vessel at anchor, or a pilot vessel, or a fishing vessel attached to her nets; or it may be the foremast-head light of a vessel, under steam, with her side lights not within sight on account of distance, fog, &c.

36.—If you see a green or red light without a white light, or both a green and a red light without a white light, is the vessel carrying the light or lights seen, a vessel under steam or a vessel under sail?

A.—A vessel under sail.

37.—How do you know?

A.—Because there is no white light at the foremast head.

38.—If you see a white light over a colored light, is the vessel a vessel under sail, or a vessel under steam?

A vessel under steam. The mast-head light denotes that the vessel is under steam.

[The Examiner will then take one model of a vessel, which he will place on the table, and call it A. He will then take the mast or stand with a white and a red ball on it, and place it at the other end of the table, and call it B.]

[The Examiner should be careful that the model of one vessel only is used when the questions numbered 39 to 49 are asked.]

39.—A is a steamer going north, seeing a white light and a red light ahead at B. Are A and the vessels showing the two lights B meeting end on or nearly end on, or is B passing A, or is B crossing the path of A, and in what direction; and how do you know?

A.—Passing to port, because if I see a red light ahead, I know that the head of the vessel carrying that red light must be pointing away in some direction to my own port or left hand. The ship showing the red light has her port or left side more or less open to A.

40.—If A is going north, within what points of the compass must the vessel B showing the white and red lights be steering?

A.—B must be going from a little W. of S. to W. N. W.

41.—How do you know this?

A.—Because, the screens being properly fitted, I could not see the red light of B at all, with the vessel's head in any other direction.

42.—Is the steamer A to starboard, or to port, or to keep on?

A.—To do neither suddenly, but, if anything, to port a little.

43.—Why?

A.—To bring the red light of A to the red light of the stranger B.

[The Examiner should then explain that if the steamer A starboards, she will run across the path of the vessel carrying the lights B, because the vessel showing the red light must be passing; to port.]

[The Examiner should now substitute the mast with the white ball and green ball for the mast with the white ball and red ball. One ship only is still to be used.]

44.—A is a steamer going north, and seeing a white and green light ahead. Are A and B meeting, or is B passing A, or is B crossing the course of A, and in what direction; and how do you know?

A.—B is passing to starboard of A, because if I see a green light ahead, I know that the head of the vessels carrying that green light must be pointing away in some direction to my starboard or right ahead. The ship showing the green light has her right or starboard side more or less open to me.

45.—As A is going north, within what points of the compass must the vessel showing the white and green lights be steering?

A.—B must be going from a little E. of South to E. N. E.

46.—How do you know?

A.—Because, the screens being properly fitted, I cannot see the green light at all with the vessel's head in any other direction.

47.—Is the steamer A to starboard, or to port?

A.—To do neither suddenly, but, if necessary, to starboard.

48.—And why?

A.—To show her green light to the stranger's green light. There can be no danger of collision when the green of one vessel is opposed to the green light of another.

49.—What would be the result if you ported to a green light ahead?

A.—I should probably run right across the path of the vessel carrying the green light.

[The Examiner should then explain that A must not port, because as the vessel showing the white and green lights B, must be passing to starboard, A would run across the path of B by porting.]

[The Examiner should now place the models of two steamers on the table meeting end on. One he should call A, and the other B.]

50.—If a steamer A sees the *three* lights of another steamer B ahead or nearly ahead, are the two steamers meeting, passing, or crossing?

A.—Meeting end on, or nearly end on.



51.—Do the regulations expressly require the helm of a ship to be put to port in any case; and if so, when?

A.—Yes; in the case of two steamers or two sailing vessels meeting end on, or nearly end on.

52.—Do they expressly require the helm of a ship to be put to port in any other case; and if so, what other?

A.—No. The use of the port helm is not in any other case expressly required by the regulations.

[The Examiner should then explain that the only case in which port-helm is mentioned in the regulations, is in Article 11 and 13, for two ships meeting end on.]

53.—If you port to a green light ahead, or anywhere on your starboard bow, and if you get into collision by doing so, do you consider that the regulations are in fault?

A.—No; because the regulations do not expressly require me to port in such a case, and because by porting I know that I should probably and almost certainly run across the other vessel's path, or run into her.

[The Examiner should see the candidate put the models in the positions indicated by the questions 54 and following.]

54.—If a steamer A sees another steamer's red light B on her own starboard side, are the steamers meeting, passing, or crossing; and how do you know?

A.—Crossing; because the red light of one is opposed to the green light of the other; and whenever a green light is opposed to a red light, or a red light to a green light, the ships carrying the lights are crossing ships.

55.—Is A to stand on; and if not, why not?

A.—A has the other vessel B on her own starboard side. A knows she is crossing the course of B, because she sees the red light of B on her (A's) starboard side. A also knows she must get out of the way of B, because Article 14 expressly requires that the steamer that has the other on her own starboard side, shall keep out of the way of the other.

56.—Is A to starboard or to port in such a case?

A.—A must do what is right, so as to get herself out of the way of B; she must starboard if necessary, or port if necessary; and she must stop and reverse if necessary.

57.—If A gets into collision by porting, will it be because she is acting on any rule?

A.—No; the rule does not require her to port. If she ports, and gets into collision by porting, it is not the fault of any rule.

58.—If a steamer A, sees the green light of the steamer B on her own (A's own) port bow, are the two steamers meeting, passing, or crossing; and how do you know?

A.—Crossing ; because the green light of one ship is shown to the red light of the other.

59.—What is A to do, and why ?

A.—By the rule contained in Article 18, of the Regulations, A is required to keep her course, subject only to the qualification, that due regard must be had to all dangers of navigation ; and that due regard must also be had to any special circumstances that may exist in any particular case, rendering a departure from that rule necessary, in order to avoid immediate danger. The crossing ship B on A's port side, must get out of the way of A, because A is on B's star-board side.

60.—A, a steamer sees the green light of another steamer B, a point on her, A's port bow. Is there any regulation requiring A to port in such a case, and if so, where is it to be found ?

A.—There is not any.

61.—Are steam ships to get out of the way of sailing ships ?

A.—If a steamer and a sailing ship are proceeding in such direction as to involve risk of collision, the steamer is to get out of the way of the sailing ship.

62.—What is to be done by A, whether a steamer or sailing ship, overtaking B ?

A.—A is to keep out of the way of B.

63.—When, by the rules, one of two ships is required to keep out of the way of the other, what is the other to do ?

A.—To keep her course.

64.—Is there any qualifications or exception to this ?

A.—Yes. Due regard must be had to all dangers of navigation, and to any special circumstances which may exist in any particular case to avoid immediate danger.

65.—Is there any general direction in the steering and sailing rules ; and if so, what is it ?

A.—Yes ; it is this : that nothing in the rules shall exonerate any ship, or the owner, master, or crew thereof, for the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper look-out, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

66.—Can you repeat article (—), of the regulations. I refer to the article containing the rule for (—) ?

[The Examiner should repeat this question, naming a different article each time.]

67.—What does the Act of Parliament provide as to the obligation of owners and masters in obeying the regulations respecting lights, fog signals, and steering and sailing ?

A.—Section 27 of “the Merchant Shipping Act, 1862,” provides that owners and masters shall be bound to obey the regulations, and it also provides that in case of wilful default by the master or owner, he shall be deemed to be guilty of a misdemeanor for each infringement.

68.—What do breaches of the regulations imply ?

A.—If an accident happens through non-observance of the regulations, it implies wilful default on the part of the person in charge of the deck at the time, unless it is shown to the satisfaction of the court hearing the case, that the special circumstances of the case rendered a departure from the rules necessary.

69.—If collision ensues from a breach of the regulations, who is to be deemed in fault for the collision ?

A.—The persons by whom the regulations are infringed, unless the court hearing the case, decides to the contrary.

70.—Do the regulations apply to sea-going ships in harbours and in rivers ?

A.—Yes ; unless there is any rule to the contrary made by a competent authority.

71.—Do they apply to British ships only ?

A.—No ; to foreign ships as well.

72.—When did the present regulations come into operation ?

A.—On 1st June, 1863.

73.—Do you know where the present regulations are to be found ?

A.—Yes ; in “the Merchant Shipping Act Amendment Act, 1862,” and the Order in Council of the 9th January, 1863. Copies are given away on application to the Board of Trade.

74.—Is one ship bound to assist another in case of collision ?

A.—Yes.

75.—What is the penalty for default ?

A.—If the master or person in charge of the ship, fails to render assistance without reasonable excuse, the collision is, in absence of proof to the contrary, to be deemed to be caused by his wrongful act, neglect, or default.

76.—Is there any other penalty attached to not rendering assistance ?

A.—Yes. If it is afterwards proved that he did not render assistance, his certificate may be cancelled or suspended by the court investigating the case.

77.—Is it not expected that you should understand the regulations before you take charge of the deck of a ship ?

A.—It is.

78.—Why ?

A.—If I do not understand them and am guilty of default, the consequence will be very serious to me.

79.—What would be a serious offence?

A.—To cause a collision by porting the helm when not required to port by the regulations and without due consideration.

Q.—Two vessels on opposite tacks, which ought to give way?

A.—The one on the port tack.

Q.—You are standing on the starboard tack, and a vessel is coming right for you on the port tack, and he wont brace up; what will you do?

A.—The only way to avoid damage is to tack.

Q.—Suppose you are going before the wind, and that a vessel is attempting to cross your bows; how will you act?

A.—Go under her stern.

Q.—Two vessels meeting—one by the wind and the other going free; which must give way?

A.—The one with the wind free, must give way to the one close hauled.

Q.—Two ships—each with the wind a point abaft the beam, and standing towards each other, and will inevitably come into collision, if they continue their course; one is steering E. by S., and the other W. by S. with the wind at north; what is the duty of each?

A.—When ships having the wind large or abeam, meet, they are to pass on the port side of each other; therefore, the ship standing to the eastward keeps away, and the other ship hauls up.

## BOARD OF TRADE INSTRUCTIONS

### *For the Guidance of Masters and Seamen, when using the Mortar and Rocket Apparatus for Saving Life.*

In the event of your vessel stranding on the coasts of the United Kingdom, and the lives of the crew being placed in danger, assistance will, if possible, be rendered from the shore in the following manner, namely:—

1.—A rocket or shot with a thin line attached, will be fired across your vessel. Get hold of this line as soon as you can, and when you have secured it, let one of the crew be separated from the rest, and, if in day time, wave his hat or his hand, or a flag or handkerchief; or, if at night, let a rocket, a blue light, or a gun be fired, or let a light be displayed over the side of the ship, and be again concealed, as a signal to those on shore.

2.—When you see one of the men on shore separated from the rest, wave a Red flag, or (if at night) show a Red light, and then conceal

it; you are to haul upon the rocket line until you get a tailed block with an endless fall rove through it.

3.—Make the tail of the block fast to the *mast about fifteen feet above the deck*, or if your masts are gone, to the *highest secure* part of the vessel. When the tail block is made fast, and the rocket line unbent from the whip, let one of the crew be separated from the rest, and make the signal required by Article 1 above.

4.—As soon as the signal is seen on shore, a hawser will be bent to the whip line, and will be hauled off to the ship by those on shore.

5.—When the hawser is got on board, the crew should at once make it fast to the same part of the ship as the tailed block is made fast to, *only about eighteen inches higher, taking care that there are no turns of the whip line round the hawser.*

6.—When the hawser has been made fast on board, the signal directed to be made in Article 1, above, is to be repeated.

7.—The men on shore will then pull the hawser taut, and by means of the whip line, will haul off to the ship a sling life-buoy, into which the person to be hauled ashore is to get and be made fast. When he is in, and secure, one of the crew must be separated from the rest, and again signal to the shore as directed in Article 1 above. The people on shore will then haul the person in the sling to the shore, and when he has landed, will haul back the empty sling to the ship for others. This operation will be repeated until all persons are hauled ashore from the wrecked vessel.

8.—It may sometimes happen that the state of the weather and the condition of the ship will not admit of a hawser being set up; in such cases a sling life-buoy will be hauled off instead, and the ship-wrecked persons will be hauled through the surf, instead of along a hawser.

Masters and crews of stranded vessels should bear in mind that **SUCCESS** in landing them in a great measure **DEPENDS UPON THEIR COOLNESS, AND ATTENTION TO THE RULES HERE LAID DOWN**; and that by attending to them many lives are annually saved by the mortar and rocket apparatus on the coasts of the United Kingdom.

The system of signalling must be strictly adhered to; and all women, children, passengers, and helpless persons should be landed before the crew of the ship.

COMMERCIAL CODE OF SIGNALS.

*General Explanation of Signal Book.*

THE number of Flags required for the "Commercial Code" is Eighteen, to which is added a Pennant, adopted as a "Code Signal."

The Code Flags are represented by the following Eighteen Letters or Signs:—B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W.

The Flags to be hoisted *at one time never exceed Four.*

A Signal is always made in *one hoist, in one place.*

*Each Signal* composed of Two or more of the Flags or Signs employed has throughout the Code but *one signification.*—*No Distinguishing or Divisional Flag or Pennant is used* to give the same series of Signals, or combination of Signs, a *different meaning.*

*Single Flags* are not used for *Code Signals*, with the exception of the "Affirmative," "Negative," and "Answering" Pennants.

The nature of the Signals is indicated by the number of the Flags hoisted, whether Two, Three, or Four together; thus,

*Two Flags* together denote *Urgent and Important* Signals.

*Three Flags* together denote Signals relating to general topics of information and inquiry.

*Four Flags* together denote *Geographical and Vocabulary* Signals, and *Ships' Names.*

By the arrangement of the Flags—that is *Burgee, Pennants, and Square Flags*—a distinctive character is given to Signals, as explained at pages 78 and 79.

All the Signals of Part I, of the Code are made in hoists either of Two Flags together, or Three Flags together, with the exception of the *Geographical Table.* These Signals are made in hoists of *Four Flags together.*

An *Alphabetical Index* to the *Geographical Table* is added at the end of the Book.

Distinct Signals are provided for Compass Signals; Latitude, Longitude, Time, and Numeral Signals; with Alphabet and Spelling Tables.

A margin for additional Signals is left; but the blanks do not appear in the Signal Book. The Signals omitted must not be appropriated without authority.

The Authority and Seal of Office of the Board of Trade is alone granted to English Editions subjected to the supervision of that Department.

## ARRANGEMENT OF SIGNAL BOOK.

The Signal Book proper is divided into Two Parts; viz., the condensed Code, Part I.; the enlarged Vocabulary and Index, Part II.

The Signals are expressed by the various combinations of the Eighteen Signs B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W. arranged throughout in the progressive order which they naturally follow.

The combinations commence with BC, being the *first* combination of the *first and second* Signs taken together; then BD (the *first and third* Signs); and next, the *first and fourth*, *first and fifth*—and so on until all the combinations of Two Signs together are exhausted, in which the Sign B *stands first*.

The second Sign, C, and each succeeding Sign, is then taken separately in its turn, and the combinations of Two Signs together, in which they *severally stand first*, are worked through in like manner.

The combinations of Three Signs together, and of Four Signs together, are similarly treated in order of rotation; as,

BCD, BCF, &c.; CBD, CBF, &c.

BCDF, BCDG, &c.; CBDF, CBDG, &c.

By this method a series of 78,642 distinct combinations (or Signals) may be formed from Eighteen Flags or Signs, taken two together, three together, and four together.

## PART I.

Part I. forms by itself a *condensed* Code consisting of such words and sentences as are usually required for general communications and enquiries by Signal.

In this Part the words and sentences placed opposite to the Signal Letters are arranged in groups, so that a number of phrases bearing on one subject are found together,—the General Index for reference being the Vocabulary, Part II.

## PART II.

Part II. of the Signal Book commences with the Spelling Table, which is followed by the Vocabulary and Index, alphabetically arranged, for reference to *any Signal required to be made*. This Part contains the whole of the Universal Signals in Part I., but in the alphabetical arrangement many additional Signals are inserted which are not included in Part I. These additional Signals form, as it were, an *extended Code*, and are represented by hoists of Four Flags or Signs.

The Signals of Part II. will in all Signal Books commence with the combination CBDF.

It will be seen, on referring to the Book, that the Four-flag Signals in Part II. are continued at intervals, but in regular order throughout *to the Left*, and that where the *blanks* or intervals appear Signs are affixed *to the Right* (the Letters being in smaller type). These Small Letters refer to the Two and Three Flag Signals in Part I. The Signals (Four Signs) to the Left are affixed to such words and sentences as are *not to be found in Part I.*

The distinguishing character of the Signals of Part II. is this:—The *uppermost* Flag of the *Four* composing the hoist will throughout be a *Pennant*, either C. D, or F.

### PART III.

#### DISTANT SIGNALS AND SEMAPHORES.

A Code for making Distant Signals has been added in the present Code for communicating from a distance when the colours of the Code Flags are not distinguishable.

The Symbols employed for the purpose are *Two black Balls, with Two Pennants, and Two Flags, of any Colour.*

Each Signal consists of a Hoist of 2 or 3 Symbols, one of which is always a *Ball*—the *Ball* thus marking the character of the Distant Signal. By a simple method (hereafter explained) this system of signalling has been adapted for use by *Semaphores*, of which upwards of 100 are already established on the French coasts.

It is possible that facilities of a like kind may in course of time be afforded to shipping by the establishment of similar Signal Posts on some of the salient points of our own coasts.

#### BOAT SIGNALS.

A Code for Coasting Crafts and Boats that may not have the Signal Flags is given in this Part.

#### LIVERPOOL SIGNALS.

A Code is now added comprising the Pilot Signals, the Port Signals, and the Pilot Boats of Liverpool.

### PART IV. (Annex.)

#### CODE LIST OF SHIPS.

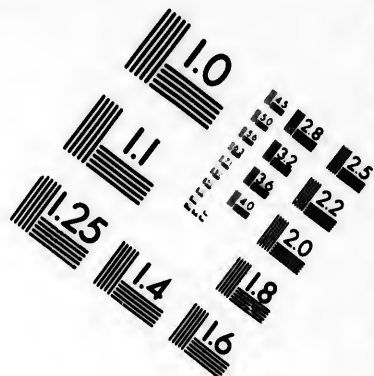
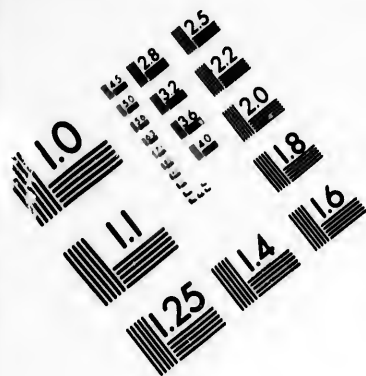
In order to give Shipmasters every facility for reporting Passing Vessels there is published annually a "Code List" containing the

#### NAME AND DISTINGUISHING SIGNAL

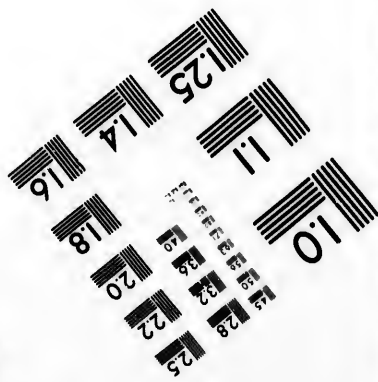
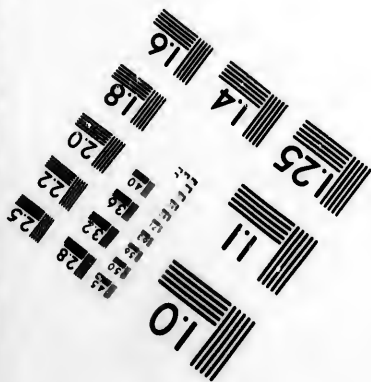
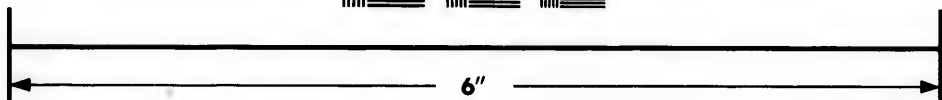
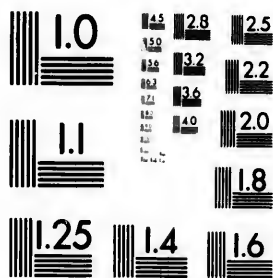
of every British Vessel that has obtained from the Registrar of Seamen, or other authorized person, the Four Letters composing her distinguishing Signal, as well as her Official Number.

This "List" is independent of the Mercantile Navy List, and is printed in a cheap and convenient form.





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**COMMERCIAL CODE OF SIGNALS.**

**Q.**—How many flags does the Commercial Code of signals consist of ?

**A.**—It consists of a "Code Signal," or "Answering Pennant," and eighteen flags—viz. : 1 Burgee, 4 Pennants, and 13 Square Flags.

**NOTE.**—The eighteen flags represent the consonants of the alphabet from B to W.

**Q.**—Describe the whole of the Flags ?

**A.**—Code Signal, or Answering Pennant, is Red and White, in vertical stripes.

**B** is the Burgee—a Red Flag with a swallow tail.

**C** is the White Pennant, with a Red spot.

**D** is the Blue Pennant, with a White spot.

**F** is the Red Pennant, with a White spot.

**G** is the Yellow and Blue Pennant—vertical.

**H** (<sup>Square</sup> <sub>flag.</sub>) is White and Red—vertical.

**J** " is Blue, White and Blue—horizontal.

**K** " is Yellow and Blue—vertical.

**L** " is Blue and Yellow—four cheques.

**M** " is Blue, with a white cross from corner to corner.

**N** " is Blue and White—sixteen cheques.

**P** " is the Blue Peter—Blue, with a White centre.

**Q** " is the Quarantine Flag—Yellow.

**R** " is Red, with a Yellow cross from side to side.

**S** " is White, with a Blue centre.

**T** " is Red, White, and Blue—vertical.

**V** " is White, with a Red cross from corner to corner.

**W** " is Blue, White, and Red—Outer border Blue, inner border White, and centre Red.

**Q.**—You want to signal by the Commercial Code—what would you hoist up ?

**A.**—The ensign with the Code Signal underneath.

**Q.**—Is the Code Signal used for any other purpose ?

**A.**—Yes ; it is also used for an answering Pennant.

**Q.**—When used for this purpose, where is it to be hoisted ?

**A.**—Where it can be best seen.

**Q.**—What are the other One-Flag signals besides the Answering Pennant ?

**A.**—" Yes" and " No."

**Q.**—What is " Yes ?"

**A.**—The White Pennant (C.)

**Q.**—What is " No ?"

**A.**—The Blue Pennant (D.)

FLAGS OF THE  
**COMMERCIAL CODE OF SIGNALS.**  
 (UNIVERSAL SERIES)



*"Code Signal and Answering Pennant."*

*"When used as the 'Code Signal,' this Pennant is to be hoisted under the 'Ensign,' when used as the 'Answering Pennant,' where best seen."*

<p><b>B</b></p>	<p><b>J</b></p>	<p><b>Q</b></p>
<p><b>C</b></p>	<p><b>K</b></p>	<p><b>R</b></p>
<p><b>D</b></p>	<p><b>L</b></p>	<p><b>S</b></p>
<p><b>F</b></p>	<p><b>M</b></p>	<p><b>T</b></p>
<p><b>C</b></p>	<p><b>N</b></p>	<p><b>V</b></p>
<p><b>H</b></p>	<p><b>P</b></p>	<p><b>W</b></p>
<p>                      Assent-Yes.</p>	<p>                      Negative-No.</p>	<p>                      Answering Pennant.</p>



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TO DISTINGUISH THE SIGNALS.

Q.—What are the Two-flag Signals ?

A.—Attention, Compass, and Urgent Signals.

Q.—How do you know an Attention Signal ?

A.—It consists of two Flags, the Burgee being uppermost.

Q.—How can you tell the quadrants of the Compass by any particular characteristic in the hoist ?

A.—From N. to E.  $\frac{1}{4}$  N. the Pennant C is uppermost.

From E. to S.  $\frac{1}{4}$  E. the Pennant D is uppermost.

From S. to W.  $\frac{1}{4}$  S. the Pennant F is uppermost.

From W. to N.  $\frac{1}{4}$  W. the Pennant G is uppermost.

Q.—What does a Two flag Signal, with a Pennant uppermost, and the Flag W. below, signify ?

A.—It is a meteorological weather forecast.

Q.—How do you know an Urgent Signal ?

A.—It consists of two Flags, a square Flag being uppermost.

Q.—What are the Three-flag Signals ?

A.—They are all general Signals.

Q.—What do they relate to ?

A.—General subjects of inquiry or communication, including latitude, longitude, time, and numeral Signals.

Q.—What are the Four-flag Signals ?

A.—Geographical, spelling and vocabulary, names of men-of-war and merchant ships.

Q.—What sort of a Signal would you hoist up for the port you are from, or the port you are bound to ?

A.—A Geographical Signal.

Q.—How do you know a Geographical Signal ?

A.—It consists of four Flags, the Burgee being uppermost.

Q.—How do you know a Spelling or Vocabulary Signal ?

A.—It consists of four Flags, the Pennants, C, D, or F, being uppermost.

Q.—How do you know when a man-of-war signals her name ?

A.—The hoist consists of four Flags, the Yellow and Blue Pennant (G) being uppermost.

Q.—How do you know when a merchant ship signals her name ?

A.—The hoist consists of four Flags, a square Flag being uppermost.

## EXAMINATION OF CANDIDATES.

The examination should tend to elicit whether the candidate possesses—

- 1st. A knowledge of the distinctive features of the Code.
- 2nd. The power of *making* and *interpreting* with facility, Signals made with flags, as well as Distance and Boat Signals.
- 3rd. The power of *interpreting* Signals made by the Semaphore.

For this purpose the examiners will be supplied with models of masts, flags, and semaphores.

The examiner should see that the candidate when called upon to *make* a Signal with Flags—

- 1st. Hoists the Ensign with the Code Pennant under :—
- 2nd. Seeks for the Signal to be made, in the *Vocabulary and Index*, Part II.

The following examination paper has been prepared as an illustration of the mode in which the examination of candidates should be conducted :—

1. How many flags are required for the Signals of the Commercial Code ?
2. Describe them ?
3. What is the object of the Code Pennant, and how is it used ?
4. How many flags are there in a hoist for an Attention Signal, a Compass Signal, and an Urgent Signal ; and how do you distinguish one from the other ?
7. What do Signals of 3 flags in a hoist principally relate to ?
8. How many flags are there in a hoist for a Geographical Signal, and how do you distinguish this Signal from others made with the same number of flags ?
9. How do you know when a Man-of-War is signalling her name ?
10. How do you know when a Merchant Ship of any nation is signalling her name ?

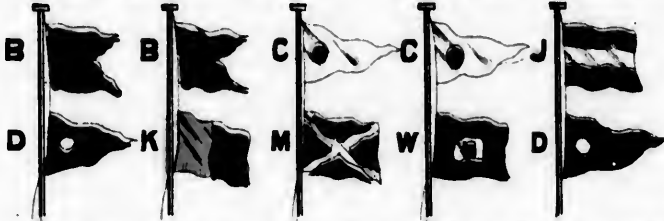
If the candidate answers the foregoing questions satisfactorily, the examiner should require him to *make* a few Signals with 2, 3, or 4 flags. The following are given as a few illustrations of the Signals the candidate should be required to *make*. The Signal Letters are added for the convenience of the examiner.

11. What ship is that ? (BD).
12. The "Golden Fleece" of London. Official No. 13,964 (LKDV).
13. Direct me how to steer ? (MDS).
14. S.W. by S. (FK.)
15. Starboard the helm (KV).
16. Hard-a-port (KT).

} *The Candidate may be required to make these or any other of the Signals by the Distance Signals.*

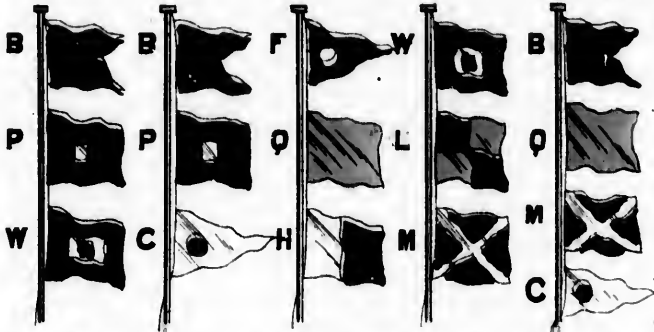
# EXAMPLES

*Attention Signals. Compass. Meteorological. Tressant Signals.*



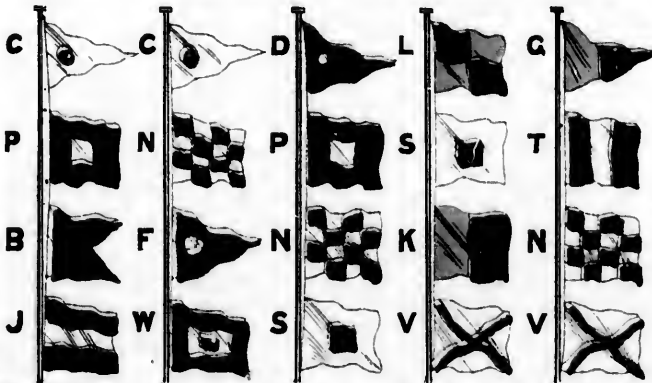
*What Ship is that. Attention, pay Attention. N.E. Report for the day gives moderate winds in direction indicated. You are standing into danger.*

*General Signals. Geographical.*



*Do you wish to be reported. When did you sail. 40 Longitude. 5000. Numerical. St. John, N.B.*

*National Vocabulary Merchant Ship Man of War*



*When were your Chronometers last rated. Captain is requested to come on board. As quick as possible. Lady Head official No. 15479. Ft. M. S. St Vincent. 26 Guns.*



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17. I shall abandon my vessel unless you will keep by us (BCQ).
18. I shall call at- (BPJ).  
-Falmouth (BDTN).
19. Can I take or forward any letters (BRQ).
20. Captain is ill (DHM).
21. Send for passengers (DLS).
22. What is your longitude? (FGH).
23. Tho- (CFPD).  
-mas (CDPR).  
-will sail- (DRPW).  
-in the- (DFQR).  
-“Renown.” Official No. 28,781 (QBRJ).

The candidate should be practised in the use of the Spelling Table, by being required to spell his own name, or some word not in the Vocabulary Code.

When the candidate has satisfied the examiner that he understands how to *make* Signals by the ordinary Flags and by the Distance Code, his ability to *interpret* Signals should be tested by the examiner. With this view the examiner should place a few of the various Flag Signals on the board. The candidate should at once be able to tell the *character* of each Signal from the *nature of the hoists*, and he should afterwards be required to find the interpretation of them in the Signal Book.

His ability to *interpret* Signals made by the Distance Code, and by the Semaphores, should be tested in the same manner.

All candidates must pass the above examination satisfactorily, but candidates, for Masters' Certificates, should in addition, be able to answer the following questions:—

24. How can you tell the Quadrants of the Compass by any particular characteristic in the hoist?  
(Answer).—From N. to E.  $\frac{1}{4}$  N. the C Pennant is uppermost.  
From E. to S.  $\frac{1}{4}$  E. the D “ “  
From S. to W.  $\frac{1}{4}$  S. the F “ “  
From W. to N.  $\frac{1}{4}$  W. the G “ “
25. What is the meaning of a Two Flag Signal with a Pennant uppermost and the Flag W below?  
(Answer).—It is a Meteorological forecast.
26. What Flag in the Spelling Table is common to every syllable?  
(Answer).—The C (white) pennant uppermost.
27. How is the Commercial Code applied in making Boat Signals?  
(Answer).—The Distance Signals are used. The symbols of Square Flags, Pennants, and Balls, can be made with handkerchiefs and hats. These Signals are *made from right to left, and read from left to right.*

28. What means are there for reporting Ships passing along the English Coast ?

(Answer).—Signal Stations have been established at many of the salient points of the coast, and on Ships passing and making their names known by Commercial Code Signals, the Officers in charge of the Stations forward reports to the *Shipping Gazette* for publication.

29. How are Signal Letters for the purpose of making a Ship's name at Sea, to be obtained for British Registered Ships ?

(Answer.)—By applying to a Registrar of Shipping at one of the Custom Houses, or to the Registrar General of Seamen in London.



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See also

DISTANT SIGNALS.

In Part III. of the Signal Book is given a set of "Distant Signals," which the Candidate is expected to have a knowledge of, and therefore it would be well if he made himself proficient in the Alphabet, and the few particular signals given below.

The symbols employed are two black balls, two pennants of any colour, and two square flags of any colour. These are combined in eighteen different ways, so as to represent the eighteen letters of the Universal Code. The characteristic of the "Distant Signal" is the *Ball*—one Ball at least appearing in every Hoist.

This Code is arranged as follows:—

The *First* Column contains all the combinations having the *Ball or Balls first or uppermost* in the Hoist.

The *Second* Column contains all the combinations having the *Ball or Balls second or separated* in the Hoist.

The *Third* Column contains all the combinations having the *Ball or Balls last or lowermost* in the Hoist.

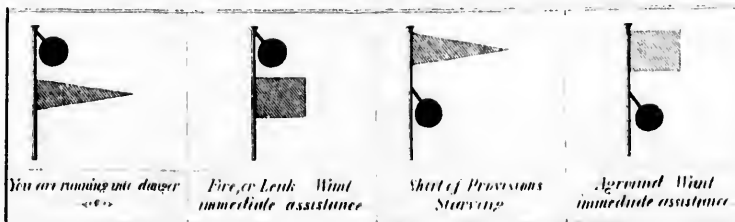
These Signals are only used when distance or haze prevents the distinguishing of the *Colours* of the *Flags*.

SIGNIFICATION of the DISTANT SIGNALS when made *simply*, which will be indicated by the "*stop*" following each Hoist.









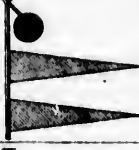
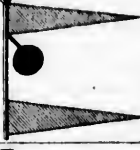
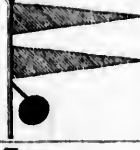




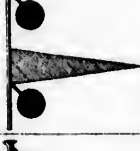




- B.** Asks name of Ship or Signal Station in sight.
- C.** Yes.
- D.** No.
- F.** Repeat Signal, or hoist it in a more conspicuous place.
- G.** Cannot distinguish your Flags. Come nearer, or make Distant Signals.
- H.** You may communicate by the Semaphore, if you please.
- J.** Stop, or bring to. Something important to communicate.
- K.** Have you any Telegrams or despatches for me?
- L.** Want a Pilot. Can I have one?
- M.** Want a Tug. Can I have one?
- N.** What is the Meteorological Weather Forecast?

- P.** Calls attention of Signal station in sight.
- Q.** Vessels asks for orders by Telegraph from Owner, Mr. --- at --- (See *qx*, Part I, and *Instructions thereto*.)
- R.** Report me by Telegraph to my Owner, Mr. --- at --- (See *qx*, Part I, and *Instructions thereto*.)
- S.** Send the following message by Telegraph.
- T.** Send the following message by the *Signal Letters* through the Telegraph.
- V.** \_\_\_\_\_
- W.** \_\_\_\_\_

In addition to the above, the following Distant Signals, composed of *Two-Symbols*, have the special signification indicated beneath.



## ALPHABET FOR COMPOSING DISTANT SIGNALS.

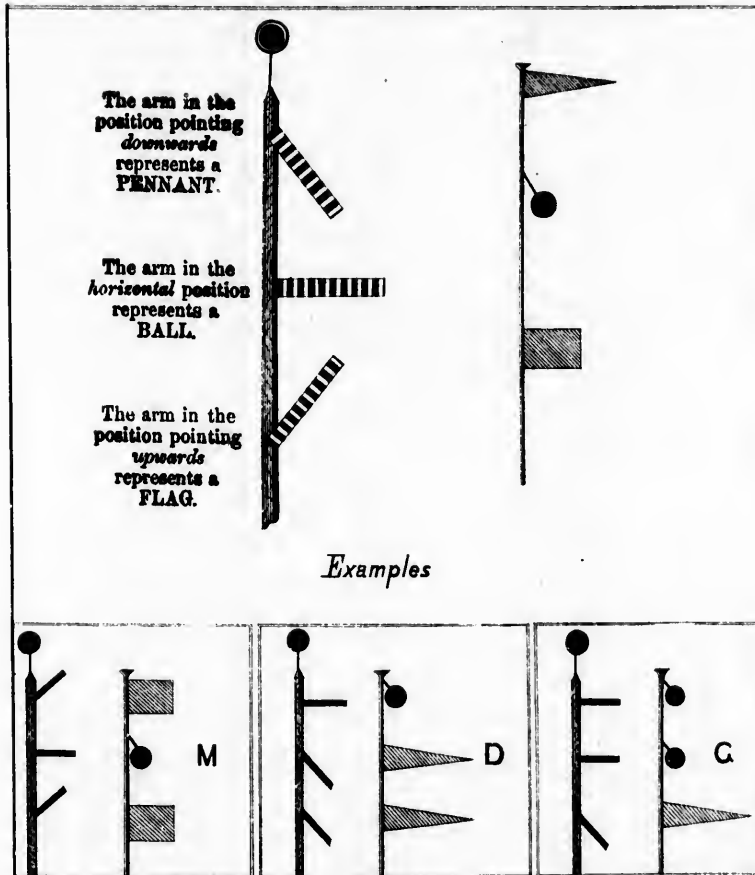
<i>Preparative</i>  <i>Answering</i>			
<i>and</i> <i>Stop after each complete Signal.</i>		<i>Answer Signal.</i>	
<b>B</b> 	<b>J</b> 	<b>Q</b> 	
<b>C</b> 	<b>K</b> 	<b>R</b> 	
<b>D</b> 	<b>L</b> 	<b>S</b> 	
<b>F</b> 	<b>M</b> 	<b>T</b> 	
<b>G</b> 	<b>N</b> 	<b>V</b> 	
<b>H</b> 	<b>P</b> 	<b>W</b> 	

ALPHABET FOR SEMAPHORE SIGNALS.

B	J	Q
C	K	R
D	L	S
F	M	T
G	N	V
H	P	W

## SEMAPHORES.

A system of Signals consisting of a vertical post with three moveable projecting arms, is extensively used at Signal Stations on the French Coast, and is known as the "Semaphore." The moveable arm of the Semaphore is equivalent to the ball of the distant Signal when horizontal, to the pennant when oblique and pointing downwards, and to the square flag when the end is pointing upwards; thus:—



MDG. "Leave the Buoy or Beacon to Port."

BOAT SIGNALS.

The Symbols to be employed are—

1. Two square flags or pieces of cloth, } Of any colour.
2. Two wets or strips of cloth. }
3. Two balls, bundles, or hats.

By means of the above Symbols, all the Signals of the *Distant Signal Code* may be made as shown below. Handkerchiefs, Hats, Buckets, or Baskets, may be used in making these Signals; and if no mast, pole, or spar is handy, these Signals can be made by holding the hat, bundle, or other symbol at arm's length. The Signals will be made from right to left, and be read from left to right.

EXAMPLES



Signifies—"You are running into danger."



J



B

Signify—JB "Accident; want a surgeon."



"Stop" or Finish after each complete Signal.

NOTE.—It is necessary, however, in using the proper means to attract attention, to avoid those which may occasion confusion.





LIST A.

DEFINITIONS IN NAUTICAL ASTRONOMY.

*The candidate is to write a short definition against so many of the following terms as may be marked with a cross by the Examiner. The Examiner will not mark less than 10. The writing should be clear and the spelling should not be disregarded.*

Q. 1.—The Equator.

A.—The Equator is a Circle passing round the Earth equally distant from the Poles dividing the Globe into the Northern and Southern Hemispheres.

Q. 2.—The Poles.

A.—The Poles are the extremities of the Earth's Axis.

Q. 3.—A Meridian.

A.—A Meridian is a Great Circle passing through both Poles crossing the Equator at right angles, and dividing the Globe into two parts, called the Eastern and Western Hemispheres.

Q. 4.—The Ecliptic.

A.—The Ecliptic is the apparent annual path of the Sun in the Heavens.

Q. 5.—The Tropics.

A.—The Tropics is that portion of the Earth between  $23\frac{1}{2}^{\circ}$  N. and  $23\frac{1}{2}^{\circ}$  S.

Q. 6.—Latitude.

A.—Latitude is that portion of the Meridian contained between the Equator and the given place, and is reckoned in  $^{\circ}$  " It is named North or South, according to the Hemisphere in which it is situated.

Q. 7.—Parallels of Latitude.

A.—Parallels of Latitude are Circles parallel to the Equator.

Q. 8.—Longitude.

A.—Longitude is an arc of the Equator, intercepted between the first Meridian (Greenwich), and the Meridian of the place.

Q. 9.—The Visible Horizon.

A.—The Visible Horizon is the Circle that bounds the observer's view at sea.

Q. 10.—The Sensible Horizon.

A.—The Sensible Horizon is the Circle that passes through the eye of an Observer whose Poles are in the Zenith and Nadir.

Q. 11.—The Rational Horizon.

A.—The Rational Horizon is the Circle parallel to the Sensible Horizon, but passing through the centre of the Earth.

Q. 12.—Artificial Horizon and its use.

A.—An Artificial Horizon consists of a Reflecting Plane parallel to the Natural Horizon, on which the rays of the Sun, or any other Celestial Object falling, are reflected back to an eye placed in a proper position to receive them; the angle between the real Object

and its reflected Image being measured with a Sextant, is double the altitude of the Object above the Horizontal Plane.

Q. 13.—True course of a Ship.

A.—The True Course of a Ship is the Compass Course corrected for Deviation, Leeway, and Variation.

Q. 14.—Magnetic Course.

A.—Magnetic Course is a Compass Course corrected for Lee-way and Deviation.

Q. 15.—Compass Course.

A.—A Compass Course is the Course steered by a Compass.

Q. 16.—Variation of the Compass.

A.—Variation of the Compass is the Angle between the true North and the Magnetic North.

Q. 17.—Deviation of the Compass.

A.—Deviation of the Compass is the Angle between the Magnetic North and the Compass North.

Q. 18.—The Error of the Compass.

A.—The Error of the Compass is the Deviation and Variation combined.

Q. 19.—Lee-way.

A.—Lee-way is the Angle between the Ship's Course by Compass, and her path through the water.

Q. 20.—Meridian Altitude of a Celestial Object.

A.—The Meridian Altitude of a Celestial Object is the highest Altitude it attains, or its Altitude when on the Observer's Meridian.

Q. 21.—Azimuth.

A.—An Azimuth is an arc of the Horizon contained between the North and South point of the Heavens, and a Vertical Circle passing through the centre of the object.

Q. 22.—Amplitude.

A.—An Amplitude is an arc of the Horizon contained between the centre of the object when rising or setting, and the East or West points of the Horizon.

Q. 23.—Declination.

A.—The Declination is the number of ° ' " the Sun, Moon, Planet, or Star is North or South of the Equator; similar to Latitude.

Q. 24.—Polar Distance.

A.—The Polar Distance is the number of ° ' " an Object is from the Elevated Pole, or Ship's nearest Pole.

Q. 25.—Right Ascension.

A.—The Right Ascension is the Distance the Sun, Moon, Planet, or Star is from the First Point of Aries, measured in time Eastward on the Equinoctial.

Q. 26.—Dip or Depression of the Horizon.

A.—The Dip or Depression of the Horizon, is the Angle contained between the Sensible and the Visible Horizon.

Q. 27.—Refraction.

A.—Refraction is the difference between the Real and Apparent Places of the Heavenly Bodies, as affected by the passage of the Rays of Light through the Atmosphere; or is that Variation which Heavenly Bodies have when viewed Obliquely through the Atmosphere.

Q. 28.—Parallax.

A.—Parallax is the Difference between an Altitude of a Celestial Body observed at the Centre of the Earth, and on the Surface of the Earth.

Q. 29.—Semi-diameter.

A.—Semi-diameter is half the diameter of the Heavenly Bodies which appear to an Observer on the Earth.

Q. 30.—Augmentation of the Moon's Semi-diameter.

A.—The Augmentation of Moon's Semi-diameter is a Correction to be added to Moon's Semi-diameter, as given in the Nautical Almanac; on account of the Moon being nearer to the Earth when above the Horizon, than when on the Horizon; and is most when she is in the Zenith.

Q. 31.—Observed Altitude.

A.—An Observed Altitude is the Height of the Sun, Moon, Planet, or Star above the Horizon, as measured by a Quadrant or Sextant.

Q. 32.—Apparent Altitude.

A.—The Apparent Altitude is the Observed Altitude corrected for Index Error and Dip.

Q. 33.—True Altitude.

A.—The True Altitude is the Apparent Altitude corrected for Refraction and Parallax.

Q. 34.—Zenith Distance.

A.—Zenith Distance is the Distance an Heavenly Body is from that Point of the Heavens which is perpendicular over our heads.

Q. 35.—Vertical Circles.

A.—Vertical Circles are Great Circles passing through the Zenith and Nadir; perpendicular to the Horizon.

Q. 36.—Prime Vertical.

A.—The Prime Vertical is a Great Circle, passing through the Zenith and Nadir; cutting the Horizon in the East and West points.

Q. 37.—Civil Time.

A.—Civil Time is that used by the generality of mankind; it begins at Midnight, and ends at Midnight following: the first 12<sup>hrs</sup> called A. M.; the last 12<sup>hrs</sup> called P. M.

Q. 38.—Astronomical Time.

A.—Astronomical Time is the Time between two successive Transits of the Mean Sun's centre over the same Meridian; which always

begins at noon (0 Mean Hours) and is reckoned through the 24<sup>h</sup> till Noon returns again.

**Q. 39.—Sidereal Time.**

**A.—**Sidereal Time is the hour angle which the First Point of Aries is Westward of the Meridian.

**Q. 40.—Mean Time.**

**A.—**Mean Time is the hour angle of the Mean Sun Westward of the Meridian.

**Q. 41.—Apparent Time.**

**A.—**Apparent Time is the Interval between Sun's departure from, and his return to the same Meridian; or Time shewn by the Sun, according to his Altitude, reckoned Westward of the Meridian.

**Q. 42.—Equation of Time.**

**A.—**Equation of Time is the Difference between Mean Time and Apparent Time.

**Q. 43.—Hour Angle of a Celestial Object.**

**A.—**The Hour Angle of a Celestial Object is an Arc of the Equator contained between the Meridian of the Place and that of the Celestial Body.

**Q. 44.—Complement of an Arc or Angle.**

**A.—**The Complement of an Arc or Angle is what that Arc or Angle is short of being 90°.

**Q. 45.—Supplement of Ditto.**

**A.—**The Supplement of an Arc or Angle is what that Arc or Angle requires to make it 180°.

#### LIST B.

### DEVIATION OF THE COMPASS.

*The candidate is to answer at least eight of such of the following questions as are marked with a cross by the Examiner. The Examiner will not mark less than 12.*

**Q. 1.—**What do you mean by Deviation of the Compass?

**A.—**Deviation of the Compass is the Error caused by Local Attraction.

**Q. 2.—**How do you determine the deviation (*a*) when in port, (and *b*) when at sea?

**A.—**Deviation is determined in Port by Reciprocal Bearings, or the Bearings of a known Object; and at Sea by Amplitudes and Azimuths.

**Q. 3.—**Having determined the deviation with the Ship's head on the various points of the Compass, how do you know when it is Easterly and when Westerly?

**A.—**We know Deviation is Easterly when the Real Magnetic Bearing is to the Right of the Bearing from the Ship; Westerly, when contrary.

Q. 4.—Why is it necessary, in order to ascertain the deviations, to bring the Ship's head in more than one direction?

A.—Because the Deviation alters as the direction of the Ship's head is changed.

Q. 5.—For accuracy, what is the least number of points to which the Ship's head should be brought?

A.—Eight Equi-distant points are the least to be used for accuracy, from which, with the aid of Napier's Diagram, a tolerable good Deviation Curve may be formed.

Q. 6.—How would you find the deviation when sailing along a well-known coast?

A.—By getting Two known Objects in one, take their Bearings, and compare it with the known Correct Magnetic Bearing. The Objects should not be less than 6 or 7 Miles distant from the Ship.

Q. 7.—In the following table give the correct magnetic bearing of the distant object, and thence the deviation :—

Ship's Head by standard Compass.	Bearing of distant object by Standard Compass.	Deviation required.	Ship's Head by standard Compass.	Bearing of distant object by Standard Compass.	Deviation required.
North	S 35° 45' E	4° 15' W	South	S 44° 15' E	4° 15' E
N. E.	S 57° 45' E	17° 45' E	S. W.	S 32° 15' E	7° 45' W
East	S 62° 15' E	22° 15' E	West	S 17° 45' E	22° 15' W
S. E.	S 53° 45' E	13° 45' E	N. W.	S 16° 15' E	23° 45' W

A.—The sum of the bearings on the above Equi-distant Points is 320° 0', which divided by 8 gives 40° 00' for the correct Magnetic bearing (approximate) of the distant object; then the difference between the correct Magnetic and Compass bearing on Each Point is the Deviation for direction of Ship's head.

Q. 8.—With the deviation as above, give the courses you would steer by the Standard Compass to make the following courses, correct Magnetic; S E and East.

A.—S 58° 45' E., and N 67° 45' E.

Q. 9.—Supposing you have steered the following courses by the Standard Compass, find the correct magnetic courses made from the above deviation table; N W and S W.

A.—By drawing a Deviation Curve the Standard Compass courses are N 68° 45' W, and S 37° 15' W.

Q. 10.—You have taken the following bearings of two distant objects by your Standard Compass as above; with the Ship's head at N E, find the bearings, correct magnetic, S W and S. E.

A.—By the Deviation table or curve, the Deviation for Ship's head N E is 17° 45' E, applied to bearings gives S 62° 45' W and S 27° 15' E.

Q. 11.—Name some suitable objects by which you could readily

obtain the Deviation of the Compass when sailing along the coasts of the English Channel ?

A.—English Channel. The South Foreland Lighthouses in one; or any prominent Point of Land or Lighthouse. St. George's Channel. Coal Rock, and Skerries Light in one. Skerries and South Stack in one. In the River Mersey, by marks on the Dock Wall, and Vauxhall Chimney in one line.

Q. 12.—Do you expect the Deviation to change; if so, state under what circumstances ?

A.—Yes, it changes rapidly for several months after the Ship is launched; an alteration also takes place by changes of Magnetic Latitude, and in Ship's running long upon one course, and then changing the course; by the heeling of the Ship, and by taking in a Cargo of Iron.

Q. 13.—How often is it advisable to test the accuracy of your table of deviations ?

A.—As often as convenient; at every opportunity; and after taking in a Cargo likely to attract the Compasses.

Q. 14.—State briefly what you have chiefly to guard against in selecting a position for the Compass ?

A.—As far as possible from any considerable Mass of Iron, and should not be near the extremity of any Elongated Mass of Iron, especially if Vertical; such as the Spindle of the Capstan, Iron Stanchions, Iron Quarter Davits, and Iron Funnels.

Q. 15.—The Compasses of Iron Ships are more or less affected by what is termed the heeling error; on what courses does this error vanish, and on what courses is it the greatest ?

A.—Greatest at North and South. Least at East and West.

Q. 16.—State to what side of the Ship, in the majority of cases, is the North point of the Compass drawn in the Northern hemisphere; and what effect it has on the assumed position of the Ship when she is steering on Northerly, and also on Southerly courses ?

A.—To the Weatherside.—To Windward on Northerly courses.—To Leeward on Southerly courses.

Q. 17.—The effect being as you state, on what courses would you keep away, and on what courses would you keep closer to the wind, in order to make good a given Compass course ?

A.—Keep away on either tacks on Northerly courses. Keep closer to the Wind on Southerly courses.

Q. 18.—Does the same rule hold good in both hemispheres with regard to the heeling error ?

A.—No. Ships which have a large heeling error to Windward in Northern Latitudes, will probably have as large a heeling error to leeward in high Southern Latitudes.

**HEAVING DOWN.**

**Q.**—You are in a foreign port and ready for sea, but getting your vessel on a rock or reef, her bottom is so much injured, that you will have to discharge her cargo and heave her down; how would you proceed, supposing you had no assistance from ashore?

**A.**—I would first send down all yards, masts, and rigging, except the lowermasts and bowsprit. Get everything moveable out from between decks, lower hold, and upper deck, keeping on board such spars as I may require for shores and outriggers, also preventive rigging for the masts.

**Q.**—Proceed to secure the mainmast ready for *heaving down*.

**A.**—Place the outriggers abreast the mast on the side to be hove out first, either on the upper deck, or through the 'tween deck ports, if the ship had them. Strip off a sheet of copper abreast the mast, as low down as possible, drive bolts into the ship's side with a good spread and clench them inboard. Secure the outriggers by strong stays set up to the ring-bolts. Lash the heels of the outriggers well down, and have guys from their ends leading fore and aft. Get sufficient preventive rigging over the mast-head to secure the mast by the outriggers. Slack up the lee rigging, and knock out the wedges in the partners, letting the mast go close over to windward. Set up the preventive and weather rigging, and just take in the slack to lee-ward.

**Q.**—How would you secure the mast on that side to be hove down, or on the lee-side?

**A.**—By double shores placed sheer fashion, the cross under the trestle-trees with a strong lashing round the mast, not forgetting to have plenty of parcelling, taking care that they do not touch the trestle trees, as the strain may injure or displace them. Have good hardwood shoes under the heels, placing them over beams, and lash them to ring bolts. Have a cross lashing between the heels to keep them from spreading fore and aft. Having the shores securely placed, wedge them up sufficiently to take part of the strain off the weather rigging.

**Q.**—Proceed to lay out your anchors for heaving down; and there being no hulk, nor wharf for your lower blocks; how would you secure them, all your resources being such as you have on board the ship?

**A.**—First moor the ship head and stern, then lay out the tripping anchors on that side to be hove out, bringing the chains under the ship's bottom, and in-board on the lee-side. Have good warps to the same anchors brought on board to the weather side. Take the anchors for the lower blocks on shore, and place one behind the



other in a line with the main-mast, pass lashing through the ring of the hindermost anchor and round the flukes of the other, and bury them well down in the ground, placing on the top of all, such heavy materials as are at hand. Drive two spars down before, and two behind the stock of the hindermost anchor, and pass a good lashing round them. Lash the upper purchase block aloft, reeve the fall, and hook the lower block on the ring of the foremost anchor

Q.—Before heaving down, what necessary precautions would you take?

A.—Top sides calked fore and aft, rig pumps down the hatches to the bilges in case of leakage, with platforms rigged to them. If spare pumps are not on board, take the ship's main pumps for the purpose. Have floating stages with plenty of oakum, pitch, tar, and shipwrights, so as to commence work immediately the ship is hove down, that the ship may be strained as little as possible.

Q.—What precaution would you take to prevent the ship from going right over?

A.—Stretch a stout hawser along the side to be hove down, in the direction of the lower channels, and to this line lash a number of empty water casks well bunged. If there are no casks, use water tanks instead.

#### IF REQUIRING HEAVY REPAIRS ABROAD.

When putting into a port abroad for repairs, after noting his protest, the first thing to be ascertained by a shipmaster, is the terms on which he can procure money; and having called a survey, he must get estimates of the probable expense attending such repairs; much after trouble may be saved by doing so. There are so many nice little pickings to be had from a vessel that reaches a port abroad in a distressed state, and requires her cargo to be discharged, that advantageous terms may generally be made with an agent; and instead of the ruinous 25 per cent. for bottomry bond, he will be satisfied with 5 per cent. commission, and a bottomry bond effected at 10 per cent., given only as a collateral security. On the other hand, with no cargo on board, and being obliged to put into a port for repairs, a shipmaster may frequently find much difficulty in procuring the necessary funds; and it would be well, if previous to leaving port, you induce your owner, if not well known abroad, to give you a letter of credit, informing all whom it may concern, that the captain is authorised to draw upon the person whose signature appears at the bottom of the letter, for a certain sum, if for necessary repairs done to his vessel, to enable him to proceed on the voyage. A letter of this kind carries some weight, and a shipmaster having such an

authority to show will not find it difficult to get his bill accepted. Of course, these observations refer to a case when the owner has no accredited agent abroad.

In cases where a loaded vessel encounters heavy weather, and puts into port for repairs, there is both general and particular average; the former is where anything has been done for the preservation of the vessel, such as cutting away spars or sails, slipping from anchors, or throwing cargo overboard; and afterwards the landing, carting, storing, and shipping of cargo, if landed, to enable the ship to complete repairs. These, together with some other items, the underwriters of the cargo all contribute to make good, as well as the underwriters of the ship and freight; consequently, with a valuable cargo, there is very little loss to a shipowner when a general average occurs. But in all cases of damage through stress of weather, getting ship ashore, &c., &c., when heavy repairs for hull and spars are required, such repairs come under the denomination of particular average, and the underwriters, if the vessel is insured, pay for it, less one-third, which it is customary for the owners of the ship to bear the loss of, upon the supposition that their vessel gets a large quantity of new articles in room of old; but as there are many expenses the owner cannot recover, such as detention, &c., it may generally be calculated that the owner's loss in a particular average, amounts to one-half, or nearly so; consequently, the system is unfair for honest men, and opens a field to dishonest ones for the display of their ability.

It sometimes happen, that the estimate for repairs amounts to almost as much as the ship is insured for, and it is better for all parties to sell the vessel.

If there be a probability of getting a ship home (especially if the owners are uninsured), without entering largely into repairs abroad, the master should do so. For instance, suppose a ship to spring a leak on the passage home, and it be found that she makes no more water in rough than in calm weather; you put into port with a view to discover the leak, and find this cannot be effected without discharging the cargo, going into dock, or heaving the ship down; one pump constantly at work, probably keeps the ship free. Now, it would be better to ship some extra hands, and proceed with the voyage; and if there be any doubt about the pumps, have an extra one or two fitted. There are generally some condemned vessel's pumps to be purchased in most ports. Lloyds' agent may probably object, but he is not infallible; and if you do what you think is right, having the opinion of a respectable merchant, and a shipmaster or two, which coincides with your own. Then no insurance officers

can blame you afterwards; as what you did was for the benefit of all concerned.

### TO GET MACHINERY IN OR OUT.

If machinery is heavy, the best plan is to cant the main-yard a little; untruss, and lash it to the mainmast, then have a spare spar, with a piece of plank under the heel, for a shore from the deck, lashed to the yard about a foot inside where the yard tackle comes. Over the main hatchway a pair of shears should be rigged, with planks under the heels, which should be on the beam before the main hatchway, and the beam should be well shored in the between decks. According to size of shears, and strength of purchase, almost any weight can be lifted out in this manner; and I would recommend young officers, when getting heavy machinery out, to use the yard tackle over the hatchway, as well as the other in case of accident; and in lowering over the side, use the tackle on the shears to lower with, as well as the yard tackle.

### TO MAKE A STERN-BOARD.

This manœuvre is of great utility, and ought to be more generally practised, when a ship will not stay. It is extremely simple, and, when it is important that no ground should be lost, preferable to wearing ship in the usual manner, as the watch at night can always manage it.

Suppose a ship to be under double reefs, foresail, main trysail, and fore topmast staysail; the best plan is to haul the foresail up, and take the main trysail in; then station hands at the after braces; put the helm down, and when the ship comes head to wind, or as close as she will come, haul the afteryards square, and she will immediately pay short round on her heel; when she gathers headway, shift the helm, haul the staysail sheet over, and trim as requisite; the foresail and main trysail can be set at leisure.

It need not be pointed out to the experienced seaman how preferable this plan is to that of putting the helm up at once, probably with the foresail set, and allowing the vessel to run for miles out of her course; and then the fore-yard flies round with a jerk, the fore-tack goes into the staysail netting, and the foresheet cannot be hauled aft, and you are absolutely compelled to keep the ship running, that the slack of the fore-tack and fore-sheet may be gathered in, or probably the foresail would be split to pieces. The only objection that can be raised to making a stern-board is, that seamen do not like stern-way in a gale of wind, especially if the vessel has much over-

hang ; but they may rest assured that there is not the slightest danger—the vessel gets very little stern way, coming round almost in her own length ; they need not be afraid of any sea injuring the vessel, by adopting the above manœuvre.

### FIRE—TO SMOTHER IT.

Having ascertained where the fire is situated, secure all the hatches and scuttles, in order to prevent, as much as possible, air getting into the hold. Then, bore with the largest augurs on board, three or four dozen holes, *nearly through*, in the deck, over the place where the fire is situated ; and whilst this is being done, plug up the scuppers ; and if the bulwarks are not tight, put plank or sails against the stanchions, in order to remedy this as far as practicable. When everything is ready, fill the deck to the height of six or eight inches with water, and then finish the boring of the holes. The reason for not boring the holes quite through in the first instance is obvious : the water being on deck keeps any current of air from rushing down, and by having the holes partially bored before the water is thrown on the deck, the persons boring will be enabled to avoid the beams. There will be no difficulty in finding the holes with eight inches of water washing about on the deck, as the hand can trace them under the water—the space occupied by the holes will not probably be more than five or six square feet. The great object is to get water to the fire without admitting a current of air ; and if a vessel has a poop and top-gallant fore-castle, the air holes in them must be blocked up. It would also be advisable to paste paper or cloth of any kind over the seams at the sides of the vessel, if smoke be found issuing from them. All hands can be employed pumping and drawing water to throw on the deck, so as to keep the water sufficiently above the holes to prevent air getting down ; and when it is considered that enough water has been allowed to run into the hold, the holes should be plugged up immediately, and an hour suffered to elapse before taking off one of the hatches, in order to ascertain the result.

I think the plan here proposed is preferable to that of boring holes in the ship's side ; for the water, pouring down upon the fire, without admission of air, creates a steam or vapor which in some measure destroys the oxygen in the atmosphere, that constituent part of it which keeps up combustion.

## MAN OVERBOARD!

This startling cry causes more excitement on board ship, than even "Breakers right ahead!" Everybody rushes aft to save a shipmate: too frequently a scene of confusion ensues, and much valuable time is lost. Every officer patrolling the weary hours of his watch, should mentally ask himself, what would be the best plan to adopt under certain circumstances; and then he would be prepared to arrest the progress of those who rush heedlessly aft without any well-defined object in view, except to lower a quarter-boat down. In light winds a rush aft to lower a boat is of little importance, as the helm may be put down without danger; but, in a strong breeze, the masts may go over the side, if something be not done before the vessel comes up in the wind. Suppose her to be running with a strong breeze, and studding-sails set, the tacks and outer lower-halliards should be let go, royal, and top-gallant halliards, and weather-head braces; the yard will go forward as the vessel rounds to, and the slack of the lee-braces can be taken in. Whilst this is being done, some hands will be getting the boat ready; and the officer of the watch should bear in mind that the whole duty of preventing, in every possible way, the loss of spars, devolves upon him; there will always be plenty of help, and frequently too much, to save the man. If a ship has no studding-sails set, and is on a wind, call the hands about ship; the crew will answer to the call at such a time with alacrity, and in five minutes you will have the ship's head turned to the drowning man; or if going round gives a weather side for lowering a boat, do not do so, but throw all aback. Under double-reef-topsails at night, no boat should be allowed to leave the ship. If, by going about, you can bring the vessel anywhere near, so as to see your shipmate (suppose on a moonlight night), then Heaven forbid that any obstacle should be thrown in the way of volunteers; but endeavour, if possible, not to let impulse govern you at such a time, but judgment. The most useful boats for lowering at sea are little Deal punts, as their lightness prevents injury in lowering, for if dashed against the side of the vessel, they will give to it, whereas a cutter would probably be stove in. It is a pity that all ships are not furnished with one of these useful boats.

Quarter-boats are often improperly secured. There are frequently so many lashings, and too often the falls are taken—which custom cannot be too strongly condemned—that it requires a long time to get them ready for lowering. In addition to the gripes, a bit of old rope for steadying fore and aft to the davit-heads, is lashing enough for any boat, and soon cut if required; but the falls should be always kept coiled in the boat, clear; four oars ought to be secured to the

thwarts, a cork or two in the landing, and thole-pins (if there are no rollocks) should be always ready at the holes to be shipped.

### RIDING AT ANCHOR IN A GALE OF WIND.

There are many who think that when a cable is veered to the clinch, that nothing more can be done to assist the vessel. Perhaps a few hints on this subject may prove useful.

A vessel when riding at anchor should never have a short scope of cable out, if the wind be strong. It is too much the practice to ride with forty-five fathoms of cable, blowing half a gale, and, in consequence, when more cable is given to the vessel, the jerking of the chain loosens the ground about the fluke of the anchor; all seamen know that when once an anchor has started in a gale of wind, it will seldom get good hold again.

Windlasses are frequently torn to pieces by the chain tightening, then slacking round, as the vessel is drawn ahead or drops astern, when riding in a roadstead in a heavy gale of wind; and many an accident would be avoided if the following plan were adopted:—Reeve a good luff tackle, and hook the single block on to the chain, close to the windlass on the fore part, the double block to be hooked to a toggle in the hause-pipe; have this hove well tight. Then put another tackle on the chain abaft the windlass, and heave it tight also; the two tackles acting against each other will keep the chain always tight round the windlass, and prevent that dreadful surging so trying to a windlass, and straining to a ship. It is much better than all the shores used to support the windlass, even if they were as thick as the mainmast; and no man will have reason to repent giving the plan a trial. The windlass will not only be better supported, but the ship will ride easier.

It is a general opinion among seamen, that ships will ride better with one anchor, and a long scope of chain, than with two anchors down, and less chain; some have suggested that veering both cables to the end, on one anchor, would be the better plan. Now, as no man likes to set his life on the hazard of a die, a second anchor should be kept in reserve. A defective link causes a chain to break, and sad disasters would have been the result if the second anchor had not brought the ship up.

When riding out a heavy gale, of course, seamen get their top-gallant masts and yards on deck; and in addition to these spars being sent on deck—if going on shore be inevitable, should the vessel part from her anchor—the lower yards should be brought as low as the lifts will admit, and the topsail-yards canted up and down the

topmasts. This will be of material assistance to the vessel in riding, and perhaps save the necessity for cutting away masts; no gear being cast adrift except the trusses, slings, and parrels, the yards can be got into their places again in an hour after the gale is over.

Should a vessel be driving, and it be necessary to let go a second anchor, if time will admit, the backing of the second anchor to the first should never be omitted; for it is too much to expect that the second anchor will hold if the first is coming home, with, perhaps, one hundred fathoms of cable out.

When a cable is veered to the clinch, there are times when it would be advisable to keep the second anchor ready backed to the first, by taking a length of stream chain, and bending one end to the chain the vessel is riding by, outside the hause-pipe, the other to the crown of the anchor intended to be let go if necessary; or two parts of a good hawser may be used for the same purpose.

These suggestions are intended for vessels that cannot be beat off a lee shore, or riding in bays,—the vessel probably discharging cargo, and not fit to go to sea,—for instance, at such places as Table Bay, or Algoa Bay.

#### RAFTS—TO CONSTRUCT SAME.

When these are wanted, it is too frequently at a time when they cannot be made; however, it may not always be so, and every seaman should have some idea how to prepare one. Lay the two largest spare spars on board over the taffrail, the ends projecting a little more than one-third over, and as wide apart from each other as one side of the ship will admit of; now lash cross pieces of studdingsail-yards, or booms, on the top of these, about every two or three feet; then lay two more of the largest spars in the same manner as the first were laid, on the top of these cross pieces, and lash them to the underneath spars and cross pieces; now lay cross pieces on the top of these every two or three feet, and between the other cross pieces; afterwards lay two more spars on the top of the cross pieces in the same manner as the first two were laid, and lash them to the two centre long spars and cross pieces. This process of laying spars may be repeated as long as there are spars to use; and having now, it is presumed, expended nearly all the spare spars on board, all the old planks, bulk heads, &c., must be collected to form a deck, which nail to the upper cross pieces, and, in addition, lash cross pieces of spars athwart the deck to keep it from the rude assaults of the waves. A tolerably good raft is now formed, and having two ropes fast to it,

the inner end may be lifted up; and as more than a third is over the taffrail, this will not be found difficult, nor the launching either, if a little grease be rubbed on the underneath part of the spars. When in the water the raft can be hauled alongside, and provisions, water, &c., secured on the top; and if there are any more small spars, place a hurricane bulwark all round it.

It must be evident that this plan can only be adopted when a vessel has but little motion, for it would be impossible to cast spars adrift for the purpose of rigging a raft in a gale of wind, or the ship rolling rails under; but the following plan for a raft appears to be so simple, and at the same time so much in the power of every seaman to construct in the heaviest gale, that it will be useful to describe the method.

Take three topmast or topgallant studding-sail booms, and lay them on the deck, then drive dogs or staples, one about a foot from the end of each spar, and about a third from the other end of each spar; pass a lashing slack through those dogs a third from the end; then lift one end of the spars up, open out, and a triangle will be formed; a lashing can now be passed through the dogs at the lower end to keep the heels steady; and, if considered requisite in consequence of the heavy lurching of the vessel, the lower ends can have a steadying line from the sides of the ship. Having got the triangle raised, there will be little difficulty in completing the raft, as the men will have the legs of the triangle to hold on by; now lash from leg to leg of the triangle three small spars close to the lower ends, and also the same number of small spars about two feet from the ends, drive staples or nails to keep the lashings from slipping, then between the cross pieces lash three empty water casks (provision barrels will answer), adopting such methods with cross lashings as will prevent the possibility of their slipping.

The raft is rigged; the upper part is the cradle, where rope may be hitched to form a sort of net-work, and a dozen men may find comparative safety in it; no sea can wash them out, and nothing can capsize a raft made in this manner. It may be lifted up by three or four men and thrown overboard in the hour of need; room for a keg of water, a cask of bread, or tin meats, can be found in the cradle; and at that awful time when all hope of keeping the vessel afloat is over, a couple of rafts, such as above described, kept close aft, to be out of the way of any rigging, would float as the vessel foundered, and be far preferable in point of safety to a boat. Or a vessel may be fast breaking up on the rocks, and no assistance can be got from the shore, then such a raft would be valuable indeed; the casks lashed so that their bilges project below the ends of the spars, would be so little under the water, even with a dozen men on the top, that the



raft would be washed almost high and dry upon the beach; no current, no breakers, can capsize it, or force it adrift, if common precaution be used in securing the lashings; and twenty minutes will rig one.

#### CUTTING MASTS AWAY.

Always cut the lee rigging away first, then the stays, and afterwards the weather rigging. If riding head to wind, cut away all the rigging on both sides, except the two foremost shrouds, then cut the stays and foremost shrouds together, and stand by for a run forward, as the mast falls on either quarter.

#### SCUDDING IN A HEAVY GALE OF WIND.

A ship should have plenty of canvas when scudding in a heavy gale, and experience seems to teach that a close-reefed main topsail, double-reefed fore topsail, reefed foresail, and a fore topmast staysail, is the sail that a vessel will steer under the best; in fact, she would steer better without a main topsail, but it is prudent to carry this sail in case of having to round to.

#### ERROR IN THE COURSE OF A SCUDDING SHIP.

When the ship is scudding in a gale, and a high sea running, with the wind on the quarter, she is generally found to have been run off to the leeward of the course intended to have been steered. This is sometimes unavoidable, to prevent the sea falling on board, but more frequently caused by bad steerage, that is, by the helmsman hanging on to his weather helm when the ship is on the top of a sea, in the room of easing it, as he ought to do, the consequence of which is, that the ship is yawed off nearly before the wind, and runs for some time so before she can be brought up to her course again. In this case the officer of the watch should mark on the log-board the course the vessel is supposed to have made good by compass; this will seldom amount to more than one point to leeward of the given course, unless the vessel has been wretchedly steered, because we may suppose she has been kept some part of the time at or even to windward of the given course. When the vessel is running in a narrow channel, or in the vicinity of a danger, it becomes of the utmost importance that this yawing off should be guarded against, by steering a point, or whatever allowance may be deemed sufficient, to windward of the given course, or by yawing her to windward as much as she has been run off, so as to make the course good. This yawing of the vessel about necessarily cuts off a considerable portion of the distance she

would have run on a straight course, hence an allowance of about one mile in ten is deducted from the distance run by log, and, as before observed, an error of one point in the course steered, will produce an error in this case of twenty miles for every hundred miles of distance run, which the ship will be to leeward of her course.

#### LAYING TO UNDER A DRAG.

When a ship has the misfortune to be dismasted, and totally unmanageable, an endeavour should be made to keep her head to the sea. This can be effected (circumstances permitting) by constructing a drag, as follows:

Lay across the rails any useless spars and lumber, so that after being lashed together they may be easily launched overboard, to which attach as much of the wreck and heavy articles as possible, so as to sink the spars and lumber square with the surface; to each end of the spars attach the ends of a piece of chain or rope in the form of a span or bridle; now pass the end of a hawser or stream-chain out through the hawse-holes, and bend it on to the middle of the span, and launch the whole concern overboard, and it will be found that the ship will ride by this drag nearly head on to the sea, because by the wind acting on the hull of the vessel, she will drift faster than the drag will allow her, consequently her head is kept up to the wind and sea. In the meantime the crew will be enabled to work more easily in the fixing up and rigging jury-masts, in consequence of the vessel having now less rolling motion.

#### TO CONSTRUCT A TEMPORARY RUDDER AT SEA.

When a ship has lost her rudder at sea, a temporary one may be made out of a thick spar, shaped into a rudder-stock, and if it is made several feet shorter than the old one, it can be better secured below water. Make the rudder with what materials are at hand, and if the upper part of the old stock has been saved, transfer the pintles, &c., to the new one, placing the pintles at the same distance as before, and prepare the rudder-head for receiving the tiller as soon as it is shipped. Now take a piece of chain, of a sufficient length for guys, middle it exactly, and mark both parts of it at intervals with exactly corresponding marks, take a round turn with the middle of this chain round the foot of the rudder-stock, and cross the guy on the fore part of the rudder, and secure it from slipping off.

Then, when the guy-lines, and the purchase for shipping it, are all prepared, launch it overboard, enter the head of the rudder in the trunk, the guys having been previously passed round, one on each

quarter (taking care that the crossing has been retained), and passed forward, are hauled taught abreast of the main rigging, and the corresponding marks on the chain are then placed at an equal distance from the rails on one side. After the pintles of the rudder are shipped, then clap tackles on the guys and haul them taught, which will bind the lower part of the rudder to the ship's stern-post, and at the same time allow it to act freely.

The guys should be cleeted to the ship's side on the first calm day, to prevent them chafing about in the wash of the sea.

The reason why the rudder is not required the whole length is, that the lower part of it, is of no use to the ship for steering purposes, and it is only the upper part of it that is acted upon by the water, and which has been proved in cases where a ship, having had the lower part of her rudder broken off at the lower gudgeon, has been steered as well as if nothing had been amiss with it.

This can be easily accounted for, when we consider the immense pressure of the ship on the water, and that as she advances, this water, being set free from under her, rushes up her run at an angle of about  $45^{\circ}$ , and must necessarily strike the upper part of her rudder with a force greater than the actual velocity at which she is going through the water.

Another, and better plan of constructing a temporary rudder, which I should more strongly recommend for simplicity of construction and efficiency: Take, say a spare topmast, or other spar of equal size (if you have not a spare spar, one of the topmasts must be taken, for a topmast can be done without, but not a rudder), ascertain by the sounding rod where the gudgeons are situated, and make corresponding marks upon the topmast for notches, so that the spar may lie close to the stern-post when overboard. If the topmast has been taken, the top may also be taken to form a rudder with. If not, build one the shape and size, with the best materials at hand, well parcelled, and bolted through. Next, bore holes in this rudder, opposite to the notches in the topmast or spar, through which and round the spar work grummetts, well parcelled and served to prevent chafing. Next, have guys leading from the back of the rudder to leading blocks attached to a smaller spar across the taffrail, or to the bumpkins, either will do, to lead into the barrel of the wheel, if it remains. Two guys (mooring chains will do) must lead from the heel of the topmast, as far forward as possible, say to the main chains; then when you have all ready for launching overboard, attach a kedge or bight to the heel of the topmast, with a slip rope to sink it close to the stern-post; the bight of a rope may also be sent down through the rudder case, and taken up with a boat hook, and made fast to a ring-bolt drove in to the head of the spar. Now, having all ready,

launch overboard, haul away upon your forward guys, and upon the line made fast to the head of the spar, and every thing will fall into its place; bring the guys from the back of the rudder through your leading blocks; bounce your forward guys taught, slip your keedge, and bring it on board again, and you will have all in working order. The topmast is a perfect fixture, and the rudder only works by the grummetts around the notches in the topmast, which, if well parcelled, will last a long time. This is in the power of every seaman to make, and requires but a little skill, and moderately calm weather.\*

### MAKING THE LAND.

This is generally a time of much anxiety, especially in tempestuous weather, when no observations have been recently obtained, because of the uncertainty in the reckoning, in consequence of the ship having been probably under the influence of currents which generally prevail near the land, and great caution is therefore required in approaching it. When *soundings* can be obtained they should *never* be neglected.

When the reckoning is doubtful, the usual practice is to get into the parallel of latitude the ship intends to make, and then steer true East or West, as the case may be, proceeding cautiously until the land is seen, but care must be taken that the ship is not too far ahead of her reckoning before falling into its parallel; as in the case of making an island, for instance, laying West of the ship, she must be sure that she is to the Eastward of it before falling into its parallel. It is therefore safest, if there is no Chronometer on board, to keep well to the Eastward before falling into its parallel, and then to steer due West. She will make it ahead.

When a ship is bound to a port on a coast which trends North and South, the land should be made at some point to windward of it, and which has a high and bold shore; then by running down the coast, the latitude by observation will point out her port of destination.

When observations for latitude and the chronometer can be depended on, they should be continued up to the latest period at which the land is expected to be seen, because of the currents or tides near the land, and which affect the ship's landfall. The observations should be verified by sounding at least once, even when the weather is clear, and compared with that laid down on the large Chart of the coast, at or near to the ship's position by observation, the bearing and distance of any part of the coast can then be ascertained, and a course shaped accordingly. It is usual to make some prominent headland or lighthouse in the daytime, or some well known light by night. If the navigator is a stranger to the coast, he will naturally

\* From a plan adopted by Captain R. McNally, in ship "Annie," of Belfast, in 1851.

consult the sailing directions, so as to form some idea beforehand of its appearance, or the character of the lights he may expect to see, so that when the land is seen he may compare it with the description given of it, and also its outline on the Chart. But to remove all doubt, the bearing of three objects on shore should be taken, and a cast of the lead; then if those bearings laid off on the chart meet at a point as a common centre, and the soundings also agree, there can be no farther doubt but that the landfall is correct. This sometimes is a matter of much importance to a stranger in making the land, because by mistaking the land or a light for some other on the same coast, fatal errors have been often committed. It is therefore prudent to test it as above mentioned, before shaping a course to any other part of the coast.

A ship on approaching a coast in thick blowing weather, where shoals lay off some distance, would naturally keep sounding as she stood in, but by mistaking the soundings so obtained for those outside of the shoals, when they were in fact those near the beach, and in standing off has run aground on the inside of the shoals. This is of frequent occurrence, and caused by an error in the reckoning; and the only remedy to guard against such an accident is to keep the lead going until the ship has made an offing equal to the distance at which the shoals lay off from the shore.

When a ship is caught by thick weather in a narrow channel, between shoals, and it is not considered prudent to anchor, she is put under easy sail, and tacked or wore round every hour or half hour, as the circumstances of the case require, until the weather clears up, and she can extricate herself.

#### SIGNS OF LAND.

There are some signs whereby it may be known when a ship is approaching land—the most infallible is that of the change in the color of the sea from a deep blue to a pea green (a sure indication of being on soundings), and from that to a muddy color as she approaches the coast, where tree-roots and other drift-wood may be met with floating about, and the coasting and fishing vessels of the country. The bearing of the land may also be known from the direction in which a flock of sea-birds are seen flying at sunset. Ducks, and other kinds of diving-birds, which do not fly far, are a sign of being near the land.

Land is seen at the greatest distance off at sunrise or sunset, before the vapors begin to collect around it, in the form of clouds, which frequently hide it from view in the day-time. This is called by seamen the loom of the land.

ROUNDING TO IN A GALE OF WIND.

Great care is requisite when rounding a ship to in a heavy gale; and to the inexperienced perhaps a hint or two may be acceptable. After taking in the foresail and fore-topsail, do not wait to furl them, but let the hands be ready to haul the main yard forward; now watch the sea well astern, and if a towering wave is coming along, wait till it passes, two others are sure to follow, and then probably for a mile astern will be seen, comparatively speaking, a moderate undulation of the water; not a moment is now to be lost, for as soon as the third mountainous wave has lifted the ship, and no more are seen likely to follow immediately, put the helm down, and round to as quickly as possible. Some men bring a ship slowly to the wind: this is not right; the sooner a ship is brought to the wind in a heavy gale the better, as it stands to reason the longer a ship's broadside is exposed to the sea, the greater is the danger of a mountainous wave rushing on board and making a clean sweep. Having succeeded in bringing the ship to the wind without accident, watch her coming up, and falling off, as directed in the hints contained when laying to in a gale of wind.

LAYING TO IN A GALE OF WIND.

Although the generality of ships will lay to better under a close-reefed main topsail than any other sail, there are some that will not; and seamen should not consider that they have done everything when they have rounded to under this sail, but should watch the compass narrowly; and if the vessel do not come up or fall off more than two points, they may rest satisfied with the sail set, but if the weather leach of the main topsail be shaken occasionally, and the vessel fall off so as to bring the wind abaft the beam, it shows that the canvas set is not suited for laying to with, and other sails must be tried. Some vessels will lay to well under a close-reefed main topsail, and fore topmast staysail, or fore staysail; others require a main trysail; but this can only be ascertained by experiment. Some vessels will not lay to under any canvas, and require fore-reaching, particularly sharp-built vessels.

It frequently happens that there is more danger when the gale is broken; the sea then tops, as seamen term it, and breaks hollow, and frequently a whole deluge of water rushes on board between the fore and main rigging, carrying everything before it; and it is discovered, too late, that the ship wants more canvas. It is strongly recommended that every officer make a little sail when he thinks the gale is breaking; the advantage of this is obvious; and if instead of

getting under the lee of the bulwark, or boat, he will stand near the man at the wheel, and have the helm put down when he sees a towering wave rushing onwards, and likely to break on board, many a fearful disaster would be avoided.

The practice of lashing the wheel chains, or wheel, cannot be too strongly condemned. I once saw a vessel nearly foundering from this cause; the only plan that ought to be allowed, with a view to assist the helmsman, is to pass a couple of round turns with a twigling line on one of the spokes of the wheel, and allow him to hold the end in his hand: this is sufficient to keep him from being thrown over the wheel, and at the same time can be let go instantly when required. If there be much jerking from the wheel chains being slack, put a watch tackle on the standing part; it can be let go immediately when necessary.

The practice of putting the helm hard down is a very bad one, many a rudder having been broken from this cause. When a ship is to, she is supposed to have no head way, but as all vessels will naturally forge ahead, it seems right that the helm should be put down a little. Sharp-built vessels will frequently, if proper canvas be set in a gale of wind, forge ahead with the helm amidships, and keep close to the wind by the hour together, without requiring the helm to be moved.

#### SQUALLS.

It is well known to seamen that there are three kinds of squalls—the white squall, the arched squall, and the descending squall. The white squall is seldom experienced by vessels trading to India, but is common enough in the Mediterranean, and as it only gives notice of its approach by a ripple on the water, great expedition is necessary to reduce canvas. A small white cloud is sometimes seen at night rising rapidly when a white squall is approaching. It cannot be said for certain that this is the case; however, it seems probable, and is worthy of attention.

The arched squall, as its name indicates, rises in the form of an arch, and if the edges are well defined, and show one unbroken circular line, it is the signal that something severe may be expected.

The descending squall is a black cloud without any regular shape, the wind from which is never felt till nearly over the mast-heads. If this kind of squall, when first seen on the horizon, rises rapidly, it is a sign that wind may be expected, and the sooner sail is reduced the better. It may be taken as a general rule, that when the clouds are broken, the edges ill-defined, and the horizon or stars seem underneath, no violent wind may be anticipated; but as there are excep-

tions to all rules, the careful officer, especially at night, will not neglect to reduce sail. Aërial currents are sometimes formed by the breaking up of a squall, which will take a topmast out of a ship, and the next minute all is calm, so that it is sometimes impossible for the most experienced seaman to judge of the weight of a squall. Always be on the safe side, especially at night time, and let the first burst of a squall strike the ship on the quarter; if it is violent the vessel will be under command, and it is better to run for a quarter of an hour out of the course than lose the topmasts. The weight of wind in a squall should never be judged of by the apparent extent of the squall, as a small black cloud will frequently bring as much wind as a large one. At daylight, the violence of a squall can be ascertained better than at night, by the ripple on the water, or by seeing through it, as sailors term it.

#### CAUGHT IN A SQUALL WITH STUDDINGSAILS SET.

The best plan is to let fly studdingsail tacks, and outer lower halliards, and get the spanker in, if set. This will give command over the vessel to keep her before the wind if requisite. In letting go royal and topgallant-halliards in a squall, never start a sheet; even the topsail-halliards may be let go, and the yard will come down without the topgallant-sheets being slacked; many a sail is split to pieces by attempting to cleve it up in a squall, whereas if the halliards only are let go, and the yards clewed down, till the first burst of the squall is over, there would be little danger of losing anything. Letting go the halliards of square sails, of course refers to a time when no studdingsails are set, as the studdingsail-halliards would prevent a yard from coming down; but if the squall is very severe, then the studdingsail-halliards should be let go, that the yards may come down, as it is better to lose a studdingsail than a topmast, and the studdingsails after the squall is over, will generally be picked up across the stays.

#### CROSSING A SHIP'S BOW AT ANCHOR.

It is not generally known among young officers that in crossing a vessel's bow riding at anchor in a tide way, the moment the vessel's masts appear in one—suppose you are looking from the poop or quarter-deck—all danger from collision is over.



## HEAVING-TO, TO COMMUNICATE.

When heaving-to, to communicate with another vessel at sea, it is advisable that the windward ship should lay with the fore-topsail to the mast. The reason for which is, that she will fall off, and come-to less, under this arrangement of her canvas than otherwise, which arises from the extent of sail-surface exposed to the wind to assist in keeping her to; while the forward sails, by being smaller in proportion, are more readily filled, in the event of having to shoot ahead. If to leeward, with the main-topsail to the mast, it is only necessary to shiver the mizen-topsail, shift the helm, and fall off.

## WHEN IN CHARGE OF BOATS.

1. Acquire the habit of sitting down in a boat, and never stand to perform any work which may be done sitting.

2. Never climb the mast of a boat, even in smooth water, to reef halyards, or for any other purpose, but unstep and lower the mast; many boats have been upset, and very many lives lost by doing so. The smaller the boat the more necessary is this and the foregoing precaution.

3. All spare gear, such as masts, sails, oars, &c., which are stowed above the thwarts, should be lashed close to the sides of a boat, and any heavy articles on the boat's floor to be secured as well as possible amidships, to prevent them falling to leeward together on a heavy lurch of the sea.

4. On a vessel getting stranded, or otherwise disabled in a heavy sea, or an open coast where there is a high surf on the beach, the crew should remain by their vessel as long as they can safely do so, in preference to taking to their boats. As a general rule much more risk is incurred in a boat than in a ship, providing the latter will hold together. Indeed, in a moderate wind on a lee-shore, in open situations, and even in a calm, there is frequently more surf than any ordinary ship's boat can with safety attempt, however well managed she may be.

5. After being compelled to desert a ship in an ordinary ship's boat, too great precaution cannot be taken before attempting to land. Viewed from seaward, a surf has never so formidable an appearance as when seen from the land; persons in a boat outside broken water are very apt to be deceived by it. They should therefore, if practicable, proceed along the land outside the surf, until abreast of a coast-guard, or life-boat, or fishing-station, whence they might be seen by those on shore, who would then signalize to them where they might safely attempt to land, or else warn them to keep off;

or who might proceed in a life boat or a fishing-boat to their aid, the generality of coast fishing-boats being far better able to stand the surf than an ordinary ship's boat, and the coast-boutmen being more skilful in managing boats in a surf than the crews of ships. If in the night time, double precaution is necessary; and it would be better to anchor the boat outside the surf until daylight than to attempt to land in the dark. For this reason an anchor and chain should always be placed in the boat before leaving the ship, and also two or three buckets, in addition to the baler or hand-pump, which should always be kept in her, so that she may be quickly relieved of any water she ships.

6. Boats may ride out a heavy gale in an open sea in safety by lashing their spars, oars, &c., together, and riding to leeward of them, secured to them by a span. The raft thus formed will break the sea; it may either be anchored or drifting, according to circumstances. If the boat has a sail, the yard should be attached to the spars with the sail loosed. It will break much sea ahead. In all cases of riding by spars, not less than two oars should be retained in the boat, to be ready for use in case of parting from the spars.

7. Where a surf breaks at only a short distance from the beach, a boat may be veered and backed through it, from another boat anchored outside the surf, when two or more boats are in company, or she may be anchored and veered, or backed in from her own anchor.

8. Ships' boats should, in addition to their oars, mast, and sails, have the following articles kept in them when at sea, and if not in them, they should be placed in them if possible before deserting a ship at sea:

A baler or hand pump, and buckets; the plug, and a spare one, both fastened by lanyards; spare thole-pins and grammetts, if rowed in that manner; two or three spare oars; a small hatchet; an anchor and cable; a long small line as a whale-line, or deep-sea lead line, and any life-buoys or belts which are on board. If in the night, or at a distance from the land, a lantern and matches, and if available blue lights or hand rockets. If beyond sight of land, a compass and telescope, and a course of fresh water and provisions; a log-line and sand-glass; a hand-lead and line; small arms and ammunition (with ball cartridges and small shot). A red flag and a boat-hook for a flag-staff might often be useful to attract attention. A red flannel shirt is a good substitute for a flag.

In addition to the above, small empty casks or breakers, tightly bunged and lashed beneath the thwarts, would partially convert any boat into a life-boat, by making it impossible for her to founder; and by leaving less space to be occupied by water if filled by a sea, they would expedite the process of pumping or baling out.

10. No ship's boat should either be lowered into, or hoisted from, the water, without first having a rope from the fore-part of the ship made fast to her bows, by which means she will be much steadied, and prevented going adrift if the tackles should happen to be only partially hooked, or carried away. The rudder should be slung, to prevent its being lost or accidentally unshipped.

#### DEVIATION OF THE COMPASS IN SHIPS LADEN WITH IRON.

From the various improvements daily taking place in the construction of wooden ships, many of those partaking of an iron form, have so affected the compasses as to produce deviations somewhat similar to those in iron ships, but in a less degree. From the extensive exportation of iron alone, a considerable amount of deviation takes place, of which the various commanders are well aware. Also, the deviations from iron, as a cargo, may be modified in the stowage of it, particularly bar iron, by occasionally laying transverse bars across the ends.

It has been assumed, where plates, boilers, or locomotives are put in as cargo, that by taking the deviations from its position on land, an approximate idea might be given as to the amount of its disturbing influence on the compasses. No confidence should be placed in such surmises, as iron, no matter what its form may be, will simply indicate the effects of magnetism from the earth, and that which may be induced by physical action. Besides, when placed on board, its arrangement becomes totally changed. Its influence on the compass will depend entirely on the combined magnetic influence of the ship, and to that it will either add or take from.

The deviation of one ship appears to form no principle or guide to what it may be in another. The deviation has been observed to vary from four degrees to even eight points. In one particular case that came under my own observation, I found as much as fifty-six degrees, or five points. In the last vessel, whose compasses I was called upon to adjust, (the iron barque "*Alumina*," which was condemned, after having been ashore off St. John harbour, in July last, but subsequently brought back to port, and repaired), when ready for sea, she was swung, by reciprocal bearings; and at the points of N. E. and S. W. respectively, I found as much as two and a quarter points deviation. She afterwards sailed for Liverpool, where she arrived safely.

**TO DETERMINE THE DEVIATION BY RECIPROCAL BEARINGS.**—The ship must be fixed in such a position that she can be gradually warped round, so as to bring her head successively upon each of the thirty-two points of the standard compass, or on each alternate point. When

the ship and compass card are perfectly steady, at a given signal, the observer on board takes the bearings of the shore compass, and the observer on shore takes the bearing of the compass on board, and so on; from point to point of the compass on board. The difference between the simultaneous bearings, is the amount of deviation at the point on which the ship's head may be at the time.

NOTE.—*The shore compass should be a good azimuth, and previous to its use, compared with the standard compass, to see if there is any difference in their reading. The spot on shore selected for the compass, must be entirely free from iron of any description, and also to avoid confusion or the chance of error, all the observations should, if practicable read from the same quadrant of the compass when the shore bearing is reversed and recorded opposite to the point of the compass to which it belongs—the shore compass gives correct magnetic bearings.*

TO DETERMINE THE DEVIATION BY THE KNOWN CORRECT MAGNETIC BEARING OF A DISTANT OBJECT. The ship being fixed and every thing prepared, as in method 1st, the observer *on board* takes the bearings of the distant objects as the ship is swung to, and then studied on each point, they being all properly tabulated, and the difference between the known and observed bearings will be the amount of deviation on the respective points of the compass.

NOTE.—*The distance of the object must depend upon the range the ship takes when swinging, brought up by the middle (in a dock). A mile or two will suffice—at anchor, or to a buoy with a long scope of chain, eight to ten miles will not be too much.*

DEVIATION WHEN WESTERLY AND WHEN WESTERLY RULE.—When the reading by the shore compass (reversed) or the correct magnetic bearing of the distant object is to the right of the reading by the compass on board, the deviation is easterly; when to the left, westerly. Thus the rule is exactly the same as that for finding the variation of the compass from an amplitude, or azimuth, substituting of correct magnetic for true bearing.

When taking observations for deviation, it is by no means necessary to commence on any particular point of the compass, nor to turn the ship in any particular direction, in a tideway, and with a moderate breeze blowing, it is probable you will have no choice of direction.

The deviation thus obtained will be those appertaining only to the compass, by which the observations are made, and for that particular part of the ship; but if while swinging the direction of the ship's head by the other compasses is noted and tabulated, the deviation of all the compasses can be found. It is not necessary that the observations should be made on more than sixteen alternate points or even eight, carefully taken with the ship *steady* on the respective points; and remember it is impossible to get accurate bearings unless the ship's head is steady upon the point for which the observation is about to be taken. There is no such thing as an accurate flying bearing.

*For a more extended explanation, see Deviation of the Compass in Iron Ships, considered practically, by W. H. Rosser, adjuster of Compasses to the firm of J. Imray & Son, London.*

## REMARKS ON THE BAROMETER.

BY THE LATE ADMIRAL FITZROY, F. R. S.

The words on scales of barometers should not be so much regarded for weather indications, as the rising or falling of the mercury; for if it stand at *Changeable*, and then rise towards *Fair*, it presages a change of wind or weather, though not so great as if the mercury had risen higher; and on the contrary, if the mercury stand above *Fair* and then fall, it presages a change, though not to so great a degree as if it had stood lower; besides which, the direction, and force of wind, are not in any way noticed. It is not from the point at which the mercury may stand, that we are alone to form a judgment of the state of the weather, but from its *rising or falling*; and from the movements of immediately preceding days as well as hours, keeping in mind effects of change of *direction*, and dryness, or moisture, as well as alteration of force or strength of wind.

In Western Europe, towards the higher latitude, the quicksilver ranges, or rises and falls, nearly three inches—namely, between about thirty inches and eight-tenths (30·8), and less than twenty-eight inches (28·0) on extraordinary occasions; but the usual range is from about thirty inches and a half (30·5) to about twenty-nine inches. Near the Line, or in equatorial places, the range is but a few tenths, except in storms, when it sometimes falls to twenty-seven inches.

The sliding scale (vernier) divides the tenths into ten parts each, or hundredths of an inch. The number of divisions on the vernier exceeds that in an equal space of the fixed scale by one.

If the barometer has been about its ordinary height, say near thirty inches, at the sea level,\* and is steady or rising—while the thermometer falls, and dampness becomes less—north westerly, northerly, or north-easterly wind—or less wind—may be expected.

On the contrary, if a fall takes place, with a rising thermometer and increased dampness, wind and rain (or snow) may be expected from the south-eastward, southward, or south-westward.

Exceptions to these rules occur when a north-easterly wind, with wet (rain or snow), is impending, before which the barometer often rises (on account of the *direction* of the coming wind alone), and deceives persons who, from that sign only, expect fair weather.

When the barometer is rather below its ordinary height, say near twenty-nine inches and a half (at the sea level *only*), a rise foretells less wind, or a change in its direction towards the northward—or less wet; but when the mercury † has been low, say near twenty-nine

\* It stands lower, about a tenth of an inch for each hundred feet of height directly upwards, or vertically, above the sea, where its average height, in England, is 29·94 inches (at 32°).

† In an Aneroid, a metallic or a wheel barometer, the hands' motion should correspond to that of mercury in an independent instrument.

inches—the first rising usually precedes, and foretells strong wind—(at times heavy squalls)—from the north-westward—northward—or north-eastward—*after* which violence a rising glass foretells improving weather, if the thermometer falls. But, if the warmth continue, probably the wind will back (shift against the sun's course), and more southerly, or south-westerly wind will follow.

The most dangerous shifts of wind, and the heaviest northerly\* gales, happen after the mercury first rises from a very low point.

Indications of approaching changes of weather, and the direction and force of winds, are shown less by the height of mercury in the tube, than by its falling or rising. Nevertheless, a height of about thirty inches (at the level of the sea) is indicative of fine weather and moderate winds.

The barometer is said to be *falling* when the mercury in the tube is sinking, at which time its upper surface is *sometimes* concave or hollow. The barometer is *rising*, when the mercurial column is lengthening; its upper surface being then, as usual, convex or rounded†.

A rapid rise of the barometer indicates unsettled weather. A slow rise, or steadiness, with dryness, shows fair weather.

A considerable and rapid fall is a sign of stormy weather and rain. Alternate rising and sinking show very unsettled weather.

The greatest depressions of the barometer are with gales from the S. E., southward, or S. W.; the greatest elevations, with winds from the N. W., northward, or N. E.

Although the barometer generally falls with a southerly, and rises with a northerly wind, the contrary *sometimes* occurs; in which cases the southerly wind is dry and the weather fine; or the northerly wind is wet and violent.

When the barometer sinks considerably, high wind, rain, or snow will follow: the wind will be from the northward, if the barometer is low (for the season)—from the southward, if the thermometer is high.

Sudden falls of the barometer, with a westerly wind, are sometimes followed by violent storms from N. W. or North.

If a gale sets in from the eastward or S. E., and the wind veers by the South, the barometer will continue falling until the wind becomes S. W., when a comparative lull may occur, after which the gale will be renewed; and the shifting of the wind towards the N. W. will be indicated by a fall of the thermometer as well as a rise of the barometer.

Three things appear to affect the mercury in a barometer:—

1. The direction of the wind—the north-east wind tending to

\* Southerly in South latitude.

† In the best columns, those of standards for example, no concavity is seen at any time.

raise it most—the south-west to lower it the most, and wind from points of the compass between them proportionally as they are nearer one or the other extreme point.

N. E. and S. W. may therefore be called the wind's extreme bearings.

The range or difference of height of the mercury, due to change of direction *only*, from one of these bearings to the other (supposing strength or force, and moisture, to remain the same) amounts in these latitudes to about half an inch (shown by the barometer as read off).

2. The amount, taken by itself, of vapour, moisture, wet, rain, or snow, in the wind or current of air (direction and strength remaining the same), seems to cause a change amounting in an extreme case to about half an inch.

3. The strength or force alone of wind from any quarter (moisture and direction being unchanged) is preceded, or foretold, by a fall or rise, according as the strength will be greater or less, ranging in an extreme case to more than two inches.

Hence, supposing the three causes to act together—in extreme cases—the mercury might range from about 31 (30·8) inches to near 27 (27·1) inches, which has happened occasionally.

Generally, however, as the three act much less strongly, and are less in accord—ordinary varieties of weather (the wind varying between S. W. and N. W.—with more or less cloudiness or rain) occur much more frequently than extreme changes.

Another general rule requires attention; which is, that the wind usually veers, shifts, or goes round *with the sun*, (right-handed in northern places, left-handed in the southern parts of the world), and that, when it does not do so, or backs, more wind or bad weather may be expected instead of improvement.

In a barometer the mercury begins to rise occasionally before the conclusion of a gale, sometimes even at its commencement, as the equilibrium of the atmosphere begins to be restored. Although the mercury falls lowest before high winds, it frequently sinks considerably before heavy rain. The barometer falls, but *not always*, on the approach of thunder and lightning, or when the atmosphere is highly charged with electricity.\* Before and during the earlier part of serene and settled weather, the mercury commonly stands high, and is stationary.

Instances of fine weather, with a low glass, occur exceptionally, but they are always preludes to a duration of wind or rain, *if not both*.

\* Thunder clouds sometime rise and spread against the wind (lower current). It is probable that there is a meeting, if not a conflict of air currents, electrically different, whenever lightning is seen. Their concurrence, when the new one advances from *polar* regions, does not depress the barometer, except in oscillation which is very remarkable at the time.

After very warm and calm weather, rain or storm is likely to occur; or any time when the atmosphere has been *heated* much above the usual temperature of the season.

Allowance should invariably be made for the previous state of the column during some days, as well as hours, because its indications may be affected by remote causes, or by changes close at hand. Some of these changes may occur at a greater or less distance, influencing neighbouring regions, but not visible to each observer whose barometer feels their effect.

There may be heavy rains or violent winds beyond the horizon, and the view of an observer, by which his instruments may be affected considerably, though no particular change of weather occurs in his immediate locality.

It may be repeated, that the longer a change of wind or weather is foretold by the barometer before it takes place, the longer the presaged weather will last; and, conversely, the shorter the warning, the less time whatever causes the warning, whether wind or a fall of rain or snow, will continue.

Sometimes severe weather from an equatorial direction, not lasting long, may cause no great fall of the barometer, because followed by a *duration* of wind from polar regions; and at times it may fall considerably with polar winds and fine weather, apparently against these rules, because a *continuance* of equatorial wind is about to follow. By such changes as these one may be misled, and calamity may be the consequence if not thus forewarned.

### RATING A CHRONOMETER OR TIMEKEEPER.

Captain Raper, R. N., in his excellent Treatise on Navigation and Nautical Astronomy, has given an exceedingly *neat and simple method of rating a chronometer*, performed by observing a star's altitude, and noting the time at the same instant. "Since every star returns to the same point of the heavens 3m. 55s.91 of mean time *earlier* every mean solar day, the return of the same star to the same altitude, or to the wire of a fixed telescope, day after day, determines the rate of a chronometer very correctly. The altitude should be *considerable*, in order to avoid errors of refraction; and the telescope, for the same reason, should be nearly in the meridian.

"RULE. To find the rate, multiply 3m. 55s.91 by the number of days elapsed, and subtract the product from the first time noted; the remainder is the time the chronometer should skew, if it went uniformly; then the difference between this, and the time it shews at the instant of observation, is the difference of the error during the interval, which gives the daily rate.



## EXAMPLE.

"At an observation of a star on May 1st, the chronometer shewed 7h. 51m. 11s.; and four days after, it shewed 7h. 35m. 44s.6: required the daily rate of the chronometer.

	h. m. s.
First time noted by the chronometer,.....	7 51 11
Daily change 3m. 55s.91 × 4 days =.....	— 15 43.6
<hr/>	
Chronometer should have shewn.....	7 35 27.4
Second time noted by the chronometer.....	7 35 41.6
<hr/>	
Gain of chronometer in 4 days.....	17.2
	4) —
Daily gain of the chronometer... ..	4.3

"The disappearance of a star behind any elevated object answers the same purpose."

This mode of rating a chronometer is particularly neat and simple, which must be admitted by every intelligent navigator; for what can be easier than to observe the altitude of any remarkable star, say 71° 30', at which time the chronometer shewed 10h. 42m. 50s.; and three nights after, when the same star had the same altitude (71° 30'), the chronometer shewed 10h. 30m. 48s.5; hence, by the preceding Rule and Example, the operation would be performed thus:

	h. m. s.
First time noted by the chronometer, star's altitude 71° 30'—	10 42 50
Daily change 3m. 55s.91 × 3 days (interval of time).....	— 11 47.7
<hr/>	
Chronometer should have shewn at second observation...—	10 31 2.3
Second time noted by the chronometer, star's altitude 71° 30'—	10 30 48.5
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Loss of the chronometer in 3 days.....	13.8
	3) —
Daily loss of the chronometer.....	4.6

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